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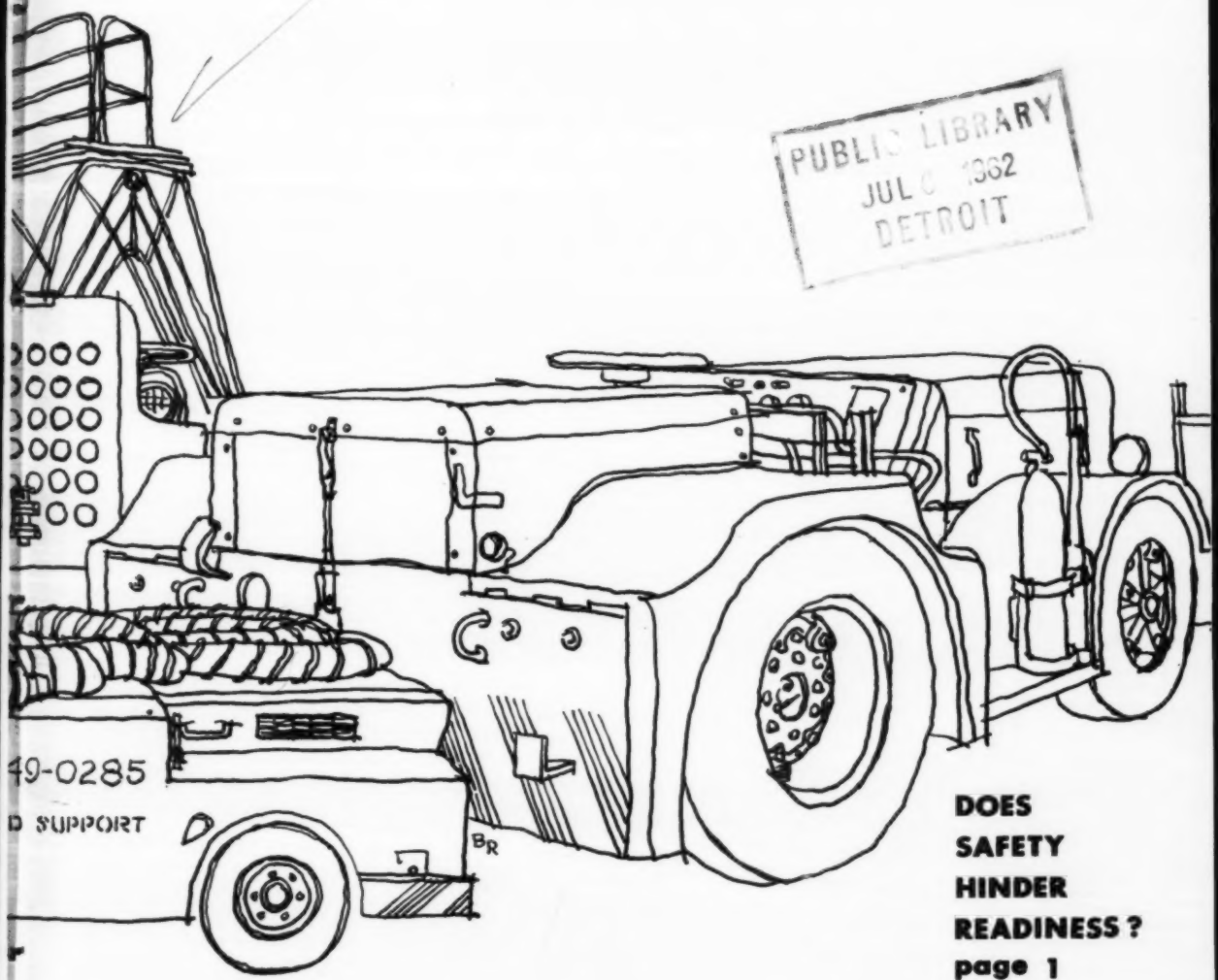

DOES SAFETY HINDER READINESS?
page 1

IS THE FLIGHT SAFETY PROGRAM HURTING COMBAT READINESS?

By
LtCol Jack Bolt

YEAS

Col D. C. Wolfe
LtCol Mark Jones
Maj A. W. O'Donnell

This side is not questioning the objectives of the Flight Safety Program. These objectives are desirable beyond any doubt. There is no complaint here. The rub comes when we get exposed to the organization and practice of flight safety.

A safety program will always be required but the present one has gotten off on the wrong track. Initially it was right. In 1951, it had to be strong and powerful to correct the habits and practices built up in the climate of wartime chaos. By 1957 the main goal had been achieved in that inertia had been overcome and Naval Aviation was thoroughly safety conscious.

Was the program then reduced or maintained at a size adequate for continuing and improving a well functioning program? Alas, it was not. As in any program that gets prime emphasis, Parkinson's Law (Law of Bureaucratic Growth) took over. Today we have an elite corps of Flight Safety Officers at every level and echelon. Tied together by a fraternal bond, they have become a society for generating, not solving, problems. Serving from a unique staff position they act as the authority for a long list of required committees, meetings and reports. In their fields they have become the masters, not the servants, of their unit commanders. The tail has outgrown the dog. The Flight Safety Program is wagging combat readiness.

The safety program started out with a worthwhile goal: to reduce aircraft accidents. In their zest to achieve this aim, the advocates of the program have convinced themselves, and often others, that a low accident rate is the end object of peacetime aviation. Using this standard of values, training that lowers the accident rate is good, training that increases the risk factor is bad.

Realistic Training Vital

Effective pilot training must increase the pilot's skills through a series of demanding, but confidence building flights. This will prepare him to be ready to meet combat conditions. Training flights which simulate realism are more difficult to perform, and involve operating the aircraft nearer its limits, than routine flights. Risks are involved in these operations. But the objective of aviation is to be able to accurately deliver weapons

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Col J. E. Conger
LtCol D. L. Cummings
Capt J. C. Brown
Capt J. A. Herber

Anyone who thinks the Flight Safety Program is hurting combat readiness is some kind of nut. Results are what count and they speak for themselves. The Flight Safety Program is producing a new generation of Marine pilots. For the first time in the history of Marine Aviation the basic fundamentals of aviation safety are being stressed. After nearly 50 years, we're finally getting around to the point where it is pretty much SOP for a pilot to know his aircraft before he is entitled to fly it.

Only about 10 years ago, when we received our first jets, did we Marines become concerned about an adequate checkout for our pilots. Maybe the high cost of jet aircraft was the dominant factor in the change. In the old days, though, if you learned much about the ship you were going to fly before you flew it, you were one of a small minority. From the basic trainer in flight school up to and including the F4U, F7F, and F8F, the required checkout was little more than "Here's the handbook, I'll help you start it."

Today, thanks to the Flight Safety Program, pilots are required to have a respectable knowledge of all the aircraft's systems, emergency procedures, fuel consumption problems, navigation equipment and flight characteristics. Only when you know these things can you take a plane into the air. This broader knowledge is the result of having professional Naval Aviators. The endless series of emergencies and accidents that marked the old days has now almost disappeared. Today's pro-

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and logistic support in combat. Realistic peacetime training is an essential step to reach this objective.

Safety records are easy to measure. The thoroughness of peacetime training and the potential combat effectiveness of a squadron are not. Some commands have made the attainment of a low accident rate their primary goal. A unit's safety record becomes the measure of its performance. When this occurs, realistic training is avoided because it is presumed to involve higher risks. Pilots are warned to avoid getting near the operating boundaries of their aircraft. Instrument flights are performed only under carefully chosen conditions so that the squares on the training syllabus board can be filled with minimum risk. Good fuel control training, using safety criteria, is to require pilots to plan their flights to land with large, excessive reserves. Night flying is cancelled where there are clouds in the sky or the moon isn't up. Pulling out early in a gunnery run becomes more important than getting hits. These practices are inconsistent with achieving a high state of combat readiness.

The Safety Program enthusiasts have become convinced that their end objective of lowering accident rates justifies any means to reach it. Their theory seems to be that a pilot must be in fear of his aircraft and his life or he will disregard some safety precept.

And the list of safety restrictions grows longer every day. More emphasis is put on what the pilot can't do safely than what he can do. This tends to create an attitude of hesitancy approaching fear in some pilots. But the most dangerous response a pilot can have in an emergency is one of doubt and panic. Thus, this approach to safety tends to defeat the goal of reducing risks. Its worst aspect is that it creates a reluctance in the pilots to explore fully their own and their aircraft's capabilities—and to learn to use them.

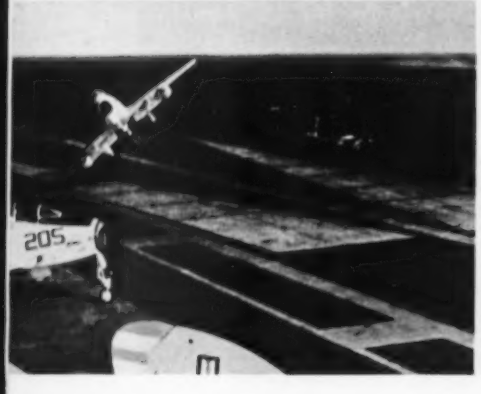
A Matter of Emphasis

When the safety program teaches sound operating practices in a positive manner, it assists in helping aviation reach its objective of combat readiness. But when it creates a state of mind which tries to avoid risks and build a safety record, it does Marine Aviation a disservice.

The Flight Safety Program today provides a good example of how a functional staff has been able to take over command prerogatives. This has been possible because the military aircraft is basically a dangerous device. Simply sitting unattended on a flight line a tactical plane is dangerous. Full of fuel, liquid oxygen, ammunition, high pressure containers and electrical power, it is an accident waiting to happen. The more strenuously it is operated the more dangerous it becomes. The operation of the aircraft is the aviation unit's primary mission. It is wrong to give a functional staff the authority to inspect, direct and control the operation of the aircraft with no responsibility whatever for the performance of the unit mission. The present chain of flight safety control from special staff officer to special staff officer clouds the authority of the unit commander and the operations officer. To place flight safety in proper perspective we must restore it to the command channel under combat readiness training.

It can be said that the Safety Center has never grounded an aircraft or directed that any tactic be discontinued. By all organizational charts and job descriptions this absurdity can be proved true. True, that is, if one chooses to ignore the informal influence of the word "safety." No shadow of doubt can fall over the staff officer who urges an

Was this aviator so spoonfed in training that no one e found



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fessional pilot handles most situations with the skill of a technician. The result generally is a deferred emergency and a routine landing. It's worth a shudder to remember how these same situations were handled a few years back. However, let's go back for a moment to the pre-safety program days.

Dubious Distinction

During WWII, Marine pilots and aircraft were classified as expendables. One of the best examples of the importance of safety is the dubious record established by the 9th MAW. While conducting advanced combat training at Cherry Point during seven months of the summer and fall of 1944, 95 aircraft were destroyed, 46 Marine aviators were killed, 156 aircraft required overhaul repair, and 30 pilots were hospitalized.

In peacetime operations today we can't afford thousands of pilot replacements and an annual billion dollar appropriation to cover accident losses. Even in wartime, the record shows, operational training losses exceed combat losses. To survive, Marine Aviation must be a financial as well as practical success.

Frankly, we've got to admit that a few individuals have used the safety program to hurt combat readiness. To avoid having accidents, they've virtually locked the birds in the barn. Then when the chips were down (bad weather, combat . . .) somebody got in trouble because he wasn't properly trained. These people fortunately, are in the minority. They've been cited only as examples of the type that give the program a bad name.

Actually the word "safety" is really the wrong word for what the program is trying to do. It's a negative defensive, uninspiring term—but we're stuck with it. We've been looking for the right word for years. So far the best substitute seems to be "reliability." Reliable air operations are certainly essential to readiness. No matter what we call the program or how we measure it, the true evaluation of performance must come from the unit's operational readiness. Typically, squadrons with the highest state of readiness are also distinguished by low accident rates. In those organizations safety is accepted, not as an end itself, but rather as a means to an end—as a by-product of sound operating practices.

Most of us agree with the meaning and objectives of aviation safety. Usually, it is with implementation of the program that critics pick their quarrel. Some of the favorite gripes are:

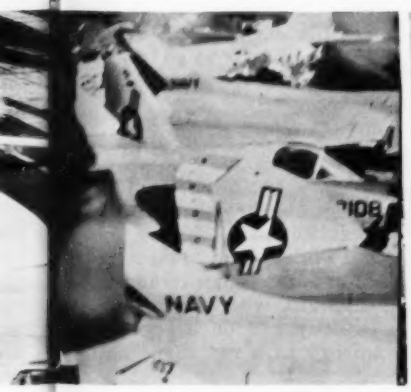
- "The methods of recording safety statistics, and command importance placed on these statistics, discourage all training involving risk."
- "Accident boards are no longer promoting accident prevention but have detériorated into tribunals for fixing blame."
- "The peacetime safety program stifles the imagination and initiative which are vital to a commanding officer in combat."

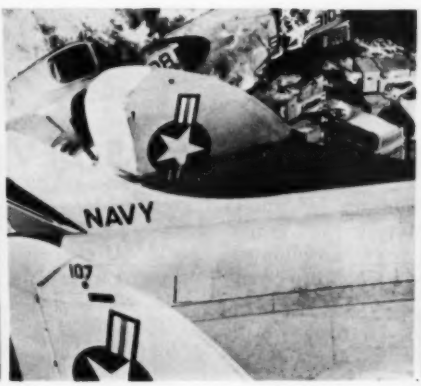
Such fears about the safety program are largely caused by lack of understanding and knowledge. This is harmful, both to the individual and to the Corps. Fear not only handicaps personal reactions but prevents full cooperation with others. And full cooperation is essential. The problems of military safety are so vast, so far-reaching, that we must all pool our ideas and work together to deflect the current of accidents.

No Threat to Command

There is also fear in some quarters that the Flight Safety Program will become an all-powerful

one e found out if he could hack it—Or was he too hot to handle?





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act in the name of safety. After all, making a human life safe is one of the prime concerns of our laws and traditions. To act for it is noble, to ignore it is callous.

Has there ever been a time when there was conflict between the safety of an individual and the safety of his nation? Of course there has. There is now. There always will be. The resolution of this conflict should be made by unit commanders on the purely objective basis of "what is best for the United States." Safety of the individual has its champion, the Flight Safety Officer. His job to lower the accident rate is clear.

Who, then, champions the cause for our nation that must be made safe by having men training to fight anywhere, any time? Maybe we need another special staff officer called the "Combat Readiness Officer." On the other hand, maybe we've got one special staff officer too many now.

This implication that we should sack the FSO is not seriously proposed. The charge that the program is doing more harm than good is serious. It will take a war to measure the harm done by the program in hurting combat readiness. The measure of the benefits of the program is the aircraft accident rate. The total accident rate of 10 accidents per 10,000 flight hours in 1936 has been reduced to two accidents per 10,000 hours in 1960.

This is very impressive. It is proof positive that the program is effective. Or is it? Have all the figures that we compare been measured by the same criteria? They have not. The old adage, "Figures don't lie," might be applicable here. The criteria used to determine just what is an accident have changed at frequent intervals.

What's an Accident?

A few years back any time you damaged a plane it counted as an accident. A few hours of metal work on a flap or prop required an aircraft accident report. Today, it doesn't. This past year, for example, a jet fighter landed wheels-up at one of our stations. Some expensive parts and a couple of hundred man hours of work went into the repair of this aircraft. By the new definition this wasn't an accident. The definition has been modified at frequent intervals to keep the accident rate moving down. This may impress outsiders but inside the program it creates distrust of the motives of the program. Besides, it will someday doom our old quip. "It's a good landing if you can walk away from it." Right now, in our single seat fighters, we have almost reached the point where we have as many fatalities as we have accidents.

Safety practices have improved a great deal in the past decade. The flight safety types deserve a great deal of credit for this. However, all the claims for accident prevention do not rightly belong to the safety boys. Technical improvements deserve a large share of the credit. Many gains reflect the higher level of experience and competence of commanders and operations officers. Other gains can be attributed to phase or level readiness training. Unit rotation should get a large share of the credit.

The biggest stride forward was made when we junked the one-year, or less, tour for squadron pilots. This ancient system of willy-nilly rotation to round out a career was a guaranteed plane buster. Today's comparatively stable two-year squadron tour provides the hard core of experience that is essential to reducing accident rates. Today's pilot is more of a professional than ever before. The new NATOPS (standardization) program will, no doubt, make him even better. How can the Safety Program claim credit for all this?

Before this, the Safety Program has not been subject to open criticism. In trying to improve the rest of Naval Aviation it has neglected itself. It is big, fat and overstuffed—but sagging badly. New life, new ideas and new direction are needed to create fresh confidence. The program should be examined, reorganized and made to serve combat readiness training. This is no quarrel with safety. Safety is paramount. Not the safety of the individual or the aircraft—but the safety of the United States. Let's act like men, expect a few losses, get on the stick, and get ready to go to war.

HOW THIS ARTICLE WAS DEVELOPED . . .

Editor's report opinions and facts were obtained by letter, interview and ready-room conversation. These were consolidated, and sometimes paraphrased, into the "yea" and "nay" sides.

There was unwillingness on the part of some persons to be identified with their spoken ideas or to write on this subject. That isn't good. As President Kennedy recently said, "If ever the United States should reach a point where the clash of ideas comes to an end, where debate disappears, where everybody agrees with everybody else on everything, then we are finished as a nation—."

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threat to command. CNO has clearly spelled out that the program is advisory in nature. The CO decides when and where to launch—not the Flight Safety Officer!

Illustrating this concept is the safety policy specified in OpNav 3710.16. It says: "Inherent in the conduct of such a program is the problem of striking a balance between safety of operations and accomplishment of the training and readiness mission. Neither the safest program nor the program which most closely simulates active combat operations will produce the optimum desired."

Nothing in this policy statement could be construed as damaging or detrimental to imagination or initiative. Nor does the statement provide a commander with an excuse to restrict operational flying, using safety as a defense. Only by a true appreciation of possible operational hazards, and knowing how to cope with them, can a commander determine his combat success probabilities.

Over the years our Armed Forces, including the Marine Corps, have developed into one of the biggest businesses in the world. Our annual expenditure, total assets, plants and properties are enormous. This is especially true in aviation units. A typical Marine fighter squadron operates 20 million dollars worth of aircraft, hundreds of thousands of dollars in ground handling equipment—a multimillion dollar business. It is reasonable, therefore, to compare our typical squadron commander with his civilian counterpart, the president of a multimillion dollar business. The difference might be in their goals—the company president is striving for high net profit, the typical commander for high combat readiness. Also, just as the company president has many factors to consider (sales, production, cost) so has the typical commander. Aviation safety is far from the least.

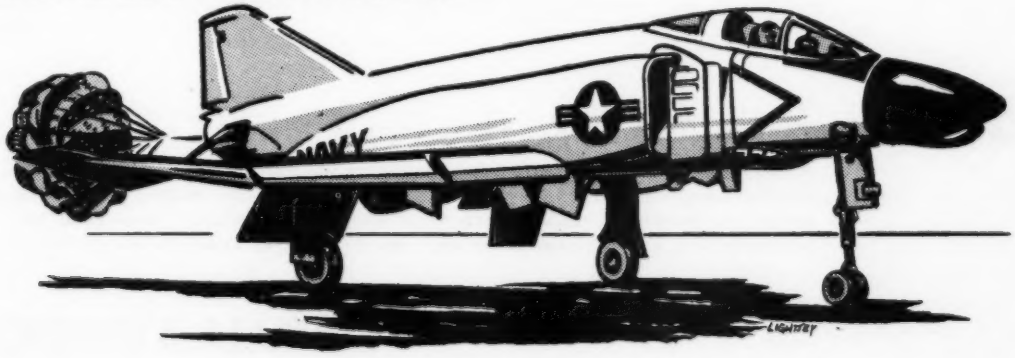
The first thought that enters the minds of a good many pilots especially the young tiger-types, is that aviation safety should be classified under the heading of "hindrance" rather than "help." Some feel that safety programs, directives and standardization serve only to restrict the aircraft's mission or to win the safety award. Nothing could be further from the truth. These people are prone to ask, especially at the squadron level, how safety affects readiness? If a squadron loses an aircraft, either to a total strike or for an extended period at overhaul repair, there always seems to be a replacement available in a pool somewhere. There they are, easy as pie, back up to strength and their readiness is back to normal.

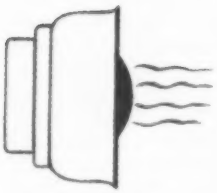
Dollars and Sense

This is a small look at a big picture. At over one million bucks per copy there are only limited numbers of F8Us, A4Ds and GVs procured. When an aircraft is lost due to an unnecessary accident, the local squadron gets a replacement. Local readiness is not impaired—but the overall readiness of the Marine Corps and the country is decreased.

The big picture is the one that counts at the international conference table. Remember this the next time some pilot criticizes the Flight Safety Program as a hindrance to operational readiness. Remind him that an aircraft lost is an aircraft lost, and a pilot dead is a pilot dead—whether it results from a spin/stall or from enemy action. ●

LtCol Bolt is an aviator by trade. He writes about flying with twenty years experience. His last GAZETTE article, "Why Marine Inflight Refueling?" (May '61) presaged the recent successful TransPac of a fighter Squadron from El Toro to Japan. He flew with VMF-115 in Korea (1952-53), followed by a short tour there as an Air Force Exchange Pilot. He spent the next three years with BuWeps (then BUAer) in fighter design.





from the Air Boss

Runners

A RECENT carrier safety council reported that flight deck personnel have been observed running alongside moving aircraft in order to pass something to the plane captain in the cockpit. *This is an extremely dangerous practice and should be discontinued.*

Fresnel Lens Glide Slope Info

When using the Fresnel Lens system, accurate glide slope information to the pilot is contingent on proper alignment of the aircraft with the centerline. This is due to the fact that the proper "Hook to Eye" setting for each aircraft model is achieved by rotating, from the horizontal, the image projected to the pilot. Wider dissemination to all pilots of the fact that correct lineup is mandatory in order to properly use the Fresnel Lens, although this information has previously been published.

Plane Captain Harness

The ASO of VF-51 discussed the feasibility of fabricating a harness for use by plane captains while manning aircraft on deck. This is considered necessary for all personnel in aircraft in motion on the flight deck.—*CVG-5*

Brief Support People

A complete briefing will be given to all support personnel that will be aboard the carrier. Carrier operations are not inherently dangerous but safety will be paramount and indoctrination through lectures should be used to the utmost.
—*VQ 1*

Inspect Tiedown Lines

It has been observed that some of the lines used for tiedowns on yellow equipment are worn or missing. All such equipment must be frequently checked for proper tiedown lines and replacements made as necessary. Lines will not be removed from the equipment for any other use.—USS INDEPENDENCE

Laxity Prevention

The Council discussed ways of improving pilot technique in carrier approaches and landings. The Air Group Commander directed that the present policy of pilot/LSO debrief and review of the movies of carrier landings be re-emphasized. As cruises approach their final stages, there is a trend toward laxity. Added effort by supervisory personnel is necessary to prevent a general letdown of all personnel under their cognizance.—*CVG-5*

Air Ops Communications

Mention was made by squadron representatives of the practice of LPH Air Operations utilizing FM squadron frequency in communications with aircraft of the squadron. It was pointed out that this had, on occasion, drowned out UHF transmissions at crucial times. The recommendation was made and concurred in that the Center use UHF only in communicating with HMR aircraft.—*USS VALLEY FORGE Safety Council Meeting*

"Crunch" Improvement

A recent report from a carrier noted that they had experienced 45 crunches on the flight deck and 14 on the hangar deck during their seven-month deployment. It was noted that this was a marked improvement over the previous year's cruise when 107 occurred. This is a gratifying improvement in an area that will be with naval aviation as long as the carrier is.

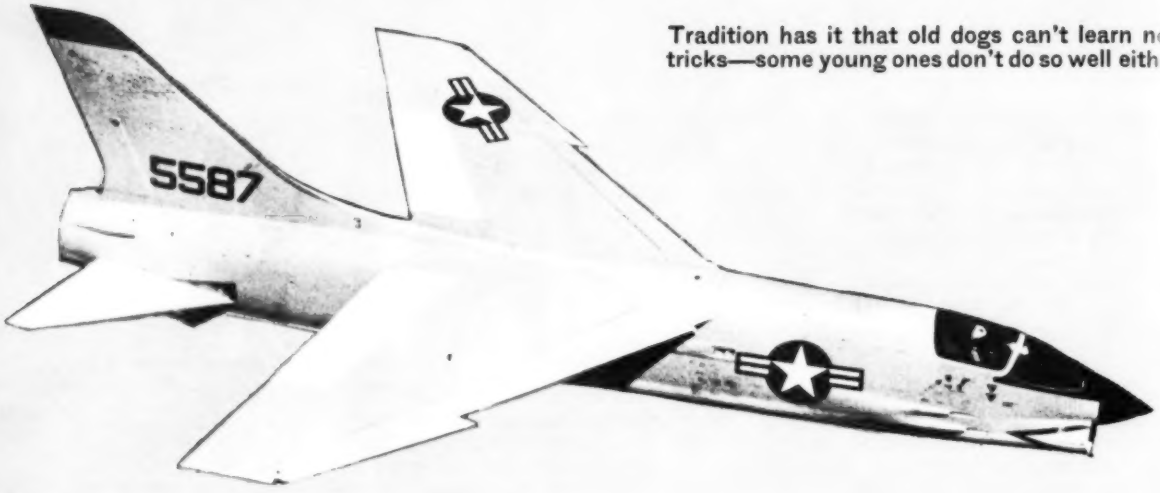
Carqual Pilot Fatigue

The new ComNavAirLant Inst 3740.12D, dated 20 December 1961 provides guidelines to the maximum number of carqual flights and arrested landings permitted per day. A pilot's commanding officer or his senior representative aboard ship is a more realistic judge of a pilot's fatigue than the pilot himself and there are situations such as long hours between flights without rest, wherein a pilot should not be scheduled for the maximum number of flights allowable. Pilots should be encouraged to attain maximum rest when not flying.

—*USS FRANKLIN D. ROOSEVELT*

Wingman's Aid

VA-55 safety officer discussed the squadron procedure for bringing a wingman down at night. It was pointed out that the lead aircraft, after dropping off the disabled wingman, should continue down the port side to be in position to rejoin the wingman for another approach in the event of a bolter or waveoff.—*CVG-5*



Tradition has it that old dogs can't learn new tricks—some young ones don't do so well either.

3 FUBARS

Three months after designation, a pilot had accumulated 385 total hours and 113 helo hours. While flying a HUP he was assigned as forward plane guard and took station, keeping about 50 feet off the water.

Since a TF-1 was to be brought aboard, the ship turned out of the wind for a downwind recovery. During this time the HUP was flying sideways with the pilot facing the starboard side of the ship. He was maintaining a sideways speed of 20 knots with true wind on the HUP's starboard quarter.

Following recovery of the TF-1, the HUP was given signal Charlie. It commenced a port turn, lost altitude and made an unintentional ditching.

No mechanical malfunction was involved in the loss of the aircraft—pilot factor was considered

A pilot with 300 jet hours out of a total of 350 hours returned from a fam hop and landed an A4D which was 2000 pounds over maximum recommended landing weight. The wind was calm at the time.

Only after the abort gear was passed and heavy braking seemed ineffective did the pilot begin to have doubts about stopping on the runway. As the A4D rolled off the bitter end of the hard surface he secured the engine. After 90 feet in soft ground the nose gear collapsed and the aircraft went up on its nose. The ground was in unprepared condition due to construction in progress.

Immediately after the accident, when questioned about landing weights, the pilot admitted he knew the max recommended and also knew the aircraft weight at the time he landed.

Why he landed in an overweight condition when there was no necessity to do so is obscured in an involved sequence of events: The aircraft was originally scheduled for an ordnance mission but it had been fueled to excess. Launching on schedule would have consumed enough time to cause the target time to be missed. A possible solution was to have the pilot scheduled for the flight launch early, burn down locally, then rendezvous with other pilots on the mission. This failed because the scheduled pilot was unavailable.

Then about the time a defueler became available, the fam pilot offered to launch and burn down to the proper weight for the ordnance flight. Permission for this was requested but the request and the subsequent approval went through several people and in the process several essential details were lost or overlooked. First was the fact that the aircraft could not be brought into the fuel pits

Mission of the F8U was night FMLP at an outlying field. When near the practice field the pilot (400 total hours) noted he was slightly overweight for landing and started to dump fuel. Shortly thereafter he felt an explosion, observed a bright flash from aft, and the airplane began to vibrate. He thought the engine had exploded but there was no fire warning light and all instruments appeared normal, including a test of the fire warning light. Several seconds after reducing throttle and shutting off the dump switch the aircraft stopped vibrating.

A 1000-foot ceiling prevented checking slow flight characteristics at high altitude and the pilot's investigation consisted of turns and speeds from 370 down to 220 knots. No check was made in the landing configuration.

Since instruments and flight characteristics appeared normal he elected to continue the flight. The MLP pattern also seemed normal except that more than usual airspeed was needed to feel comfortable. It also seemed that the aircraft was sluggish when being rolled to the left.

After half a dozen passes the pilot bingoed home. On final approach the F8U developed an excessive sink rate even with 15 knots excess airspeed and a higher than usual angle of attack indication. Generous application of power smoothed out the high sink rate prior to touchdown.

Postflight inspection revealed a large section missing from the trailing edge of the starboard outer wing panel. The missing section ran three feet deep at the wingfold line to six inches at the tip. Electrical arcing from a faulty switch in the tip area had ignited fuel vapor causing a small explosion and fire which burned for an unknown duration. Small damage from the initial explosion led to the extensive damage as a result of aerodynamic forces.

The pilot's decision to continue the hop after the inflight explosion came in for a lot of criticism. This was primarily from the fact that the explosion and flash of light seemed serious enough for him to instinctively reach for the ejection seat handles. When the airplane remained under control his inability to determine the damage was understandable but prudence should have resulted in a decision to return and land considering the aircraft had obviously endured something out of the ordinary.

the sole cause. When preparing to land aboard the pilot stopped his sideways movement, slowed to zero airspeed, momentarily entered a hover and immediately commenced a port turn. This maneuver put the wind on his tail at a critical time. Translational lift was lost and even with full power, insufficient altitude remained to develop enough forward speed to regain lift. Making a downwind turn from the starboard beam plane guard position to expedite getting aboard after the last fixed wing or HS aircraft is aboard is a violation of safe operating procedures.

Basic theory of flight should have prompted a starboard turn thereby insuring a forward speed and initiating a turn into the wind, both of which would have maintained the lift necessary for flight.

after the fam hop due to the ordnance on board. As a consequence the fam pilot would have to land with sufficient fuel for the ordnance flight, a quantity which would automatically make the landing overweight.

It is difficult to determine if the pilot elected to violate the restriction on his own accord or if he thought it was being sanctioned by supervisory personnel. At any rate he got airborne. After flying in the local area he returned to the field

There is a structural consideration in overweight landings but more important in this case was the effect on stopping distance. Although one ton over max recommended, the pilot was rolling on the runway some 2½ tons over *normal* landing weight.

Squadron procedure required a check point of 80 knots or less with 4000 feet remaining as part of the decision on whether the speed was under control. The pilot neglected to use this position and moved the checkpoint up to the abort gear which left him with only 1500 feet remaining. Approaching the abort gear he was below 80 knots and decided he did not need it in order to stop.

No skid marks were found towards the end of the runway but the brake assemblies were inspected immediately after the accident and heat discoloration was noted on both brake discs. The accident board felt the lack of effective braking was due to overheating earlier in the rollout and consequent fading in the latter stages.

As you might imagine, each of these accident reports finished off with recommendations to indoctrinate further or screw doctrine down a little tighter to take care of such things but it seems almost impossible to provide a program which will force people to T H I M K! ●

Landing with Tail Rotor Failure

There are as many opinions on how to handle a tail rotor failure in a helicopter as there are on the best way to make a martini. In this discussion, Major Jack Read and LCDR Don Palmer, who have both successfully handled tail rotor failures, take a few swipes at LCDR Jim Gilstrap who wrote the article "Unhappy Turn" in the February 1962 issue of APPROACH. LCDR Gilstrap was given an opportunity to reply to LCDR Palmer's letter and the Center's Helicopter Analyst, Major Harry Henneberger, helps to stir the pot a bit with his comments.

MCAS, Quantico, Va.—LCDR J. B. Gilstrap's "Unhappy Turn" causes a bit of chill to rise up the backbone when you read his following statement: "Regardless of his position, the pilot's first instinct should be to lower the collective except while hovering, at which time he has no alternative to splitting the needles."

His point is valid with the smaller choppers but with the big ones such a drastic procedure is not always necessary. As a member of the "Lost Tailrotor Club" I recommend that the pilot blessed with the all-forgiving landing gear of the HUS-1, HSS-1 models simply unlock brakes and tailwheel, as the case may be, and gingerly land her. The HSS-2, HSS-1, HR2S models with the large tail boom and pylons don't rotate as rapidly as you might suspect.

On water or soft earth (sod, gravel, . . .) it's a proven procedure. On hard surface it's more difficult. The spinning of the airframe and bug-eyed occupants therein diminishes sharply as collective is reduced to touchdown.

It's a hairy ride at any rate but with a load of passengers aboard try my way first. If it doesn't look right to you pick her up again and split your needles — if you have the nerve.

J. L. READ
Major, USMC

Major Henneberger's comment: *I know of at least one other chopper pilot who will agree with you. Chief Warrant Officer Ray Root sat his bird down successfully under circumstances almost identical to yours. In both your case and Ray's there was a tail rotor failure in a hover and while the aircraft was still spinning it was landed without tipping over. If you remember on Ray's first touchdown the aircraft started to tip over but it was snatched back into the air and landed the second time with a little more finesse. Your system works — there can be no doubt. But what about the HSS/HUS Flight Manual? It says to split the needles and drop it in — using remaining collective to soften the blow. Apparently you don't agree with it. I'm on your side. Maybe if we can get Ray's opinion on the matter we can get a Flight Manual Change. But there may be a few who don't agree with us. Let's wait and see.*

NAS, Dallas—I concur heartily in the article and especially the description on how to simulate tail rotor control failure. However, I do take exception with his theory on landing technique, especially in HSS aircraft.

My own theory on the landing with tail rotor control failure is to line the aircraft up with the area you wish to land on, directly into the wind at a slow cruise.

Let me say right here that I know you can fly the aircraft anywhere you should elect, unless, as in my case when the tail rotor, gear box and all left the aircraft, the vibration is extreme enough to make it advisable to pick the first available area. After line-up hold what you have in regard to power with a low rate of descent, make a roll-on landing and stop the aircraft with brakes. I personally do not elect to change RPM on roll-out and certainly do not elect to "bottom the collective" as described in the article. Only after the aircraft has stopped will I lower the collective SLOWLY and ease off on the RPM. My reasoning on this is twofold:

First, I have seen HSS Tail Wheel Locking Pins broken during the Clutch Disengagement Check by pilots who didn't use enough right rudder when bottoming the collective.

Second, I'm not knocking the landing portion of this otherwise fine article indiscriminately. I have tried it and realize how much nose swing you get with very little power change.

MELVIN D. PALMER, LCDR

Major Henneberger's comment: *During a recent HSS-2 accident investigation in the desert of West Texas I wasn't very impressed with Dangerous Don Palmer's abilities in the wide open spaces. Had we been in a survival situation depending on Don we probably would have all perished. He fired at and missed a giant desert owl roosting on a mesquite branch 50 feet away and almost managed to get himself trampled by a herd of hungry Texas steers who chased him across the desert thinking him to be the man with the groceries.*

But when it comes to tail rotor failures, Don is no slouch. He kept

an HSS-1 airborne after having lost his tail rotor and its gear box and made a powered approach to a field a mile away. Because of the small size of the field, a run-on landing was not feasible so the needles were split at 50 feet and the landing was made in autorotation.

For some comments on Don's letter and some further observations on the subject read LCDR Jim Gilstrap's rebuttal.

Thank you for the opportunity to respond to LCDR Palmer's letter. His comments, backed by a matriculation in the school of success, cause my position of calling attention to some inconsistencies that exist in his text to be somewhat humbling. Aside from the issues here, it is gratifying to see interest evinced by a former student.

His criticisms are doubtlessly well considered in view of his experience, but there is a contradictory trend in a couple of his statements. For example, I refer to his two reasons for not "bottoming" the collective.

1. Referring to Tail Wheel Locking Pins broken during the clutch disengagement check "by pilots who didn't use enough right rudder when bottoming the collective . ." This enters into a contradictory area because with no Tail Rotor there is no T/R thrust to apply, right or left. The line of zero thrust related to rudder throw is simulated with no tail rotor and is well to the right. Thus it assumes the ideal rudder position for the disengagement check if it applies to the no-tail-rotor-landing maneuver. Lowering the collective serves to remove the major detriment to directional control (torque) without further jeopardizing the landing. Indeed, the added weight on the wheels would be beneficial in limiting runout and increasing braking traction.

2. ". . . . I have tried it and realize how much nose swing you get with very little power change." This tends to verify and, perhaps, endorse the landing procedure which I am recommending because the rate and amount of power change required by the procedure recommended in the article is much less than one might expect, due to the directional sensitiveness to which he refers.

In re-reading the article, I can see that there is something to be desired in clarifying the landing technique as theoretically applied to the HSS. It is necessary to realize that *any* degree of power applied to the rotor system when RPM is stabilized will cause a single rotor helicopter to yaw nose-right to some degree which would depend on the amount of power and forward airspeed (referring now to Mr. Palmer's technique of landing with power uncompensated by RPM change). Therefore, in performing a powered landing without the aid of the tail rotor with even minimum power applied, the tail wheel will contact the ground with a sideward moment applied to the tail wheel swivel, which, in itself, would tend to shear the locking pin. Further complications are invited by the momentum that the CG would gain in its leftward swing toward alignment with the track which could cause it to overshoot the desired aligned position.

Refining the techniques described in the article in order to apply them exclusively to the HSS, I would say the following:

Maintain a glide of about 50 knots toward the first third of the landing area with normal glide power settings, and 2500 rpm. At approximately 40 feet altitude commence a flare planned to place the tail wheel on the surface in a moderate flare attitude with little or no rate of descent at about 15 knots ground speed while slowly increasing the RPM to 2700. Immediately prior to tail wheel contact, squeeze off throttle at a rate which will align the helicopter with the track just prior to tail-wheel contact and prepare to apply some aft cyclic from the instant of that contact. Cushion the contact of the MLG with aft cyclic and small, perhaps minute, application of up collective corrected with simultaneous OFF throttle pressure to maintain heading. The contact of the MLG should be "cushioned" rather than "held-off" due to the potential hazard of the blades drooping far enough to contact an aircraft structural member with excessive landing Gs as centrifugal force diminishes due to reduced rotor RPM.

After MLG contact, lower the collective, split the needles while maintaining directional control during the stop with the brakes.

As I indicated on the note which accompanied my article, I have accomplished many of what I considered to be an authentic simulation of the landing without tail rotor in HTL model aircraft and had experimented to some degree with the HO4S. I have not, however, had the opportunity to fly the HSS and, therefore, must leave a considerable "J Factor" for the maneuver in that aircraft. I maintain that the theory of the landing in the HSS is sound and the stability factor introduced by the tail-wheel configuration lends still further validity to the maneuver by virtue of the standby potential that exists in using the throttle as directional control. I feel behooved to say that it would border on foolhardyness to attempt the maneuver in the HSS without first obtaining the feel of it in the lighter birds with the semi-rigid rotor system as a part of a controlled syllabus such as that which I recommended in the initial article. It requires a great deal of conditioned thought and is fully as demanding as a properly executed autorotation, but the ability to train for the eventuality of a tail rotor failure is there, and it could possibly prevent injury and loss of life.

In conclusion, I feel I should express my sincere belief in the Center's philosophy of discussions such as was announced by the introduction to my article. When we take the time to think it over and talk about it, we have done something constructive and useful.

J. B. GILSTRAP

After a normal cat shot in an F4D on a night air intercept and instrument training flight, the Jaygee experienced two compressor stalls, then complete engine failure. He prepared to eject at an estimated 3000 feet and 160 knots. Here's his account and analysis of the ejection and rescue experience—only slightly briefed to fit available space . . .

NIGHT RESCUE

I started preparing for ejection. For some unknown reason I caught myself placing the fuel control back into normal. Felt relieved that all the variables and decisions were over and that my work was done for the night.

From this point on, I found myself in a sort of humorous state of mind. Remembered my dry run ejection the previous day and while putting down my visor I thought, "Musn't forget Aldo's (the safety officer's) visor."—then thought, "Whoa! This is no time to mix up the procedures" and put the visor back up. Put my feet in the stirrups, unclipped my flashlight, aimed it at the hole for the right rudder pedal and tossed it in with my little finger out like a lady putting a sugar lump in a cup of tea. Did the same with my kneeboard when I threw it into the left rudder pedal hole. I had predetermined this long ago while reviewing personal procedures on the ground, but never expected to get funny about it.

Then I unplugged my oxygen mask and was going to take it off but stopped with the thought, "You didn't do it in the dry run so don't do anything different now." So I merely loosened it two notches on the Hardman fittings. Had previously decided that this was going to be the first spare thing thrown away when my chute popped on an overwater ejection. (If I ever have to parachute down over land, I plan on leaving the mask on and cutting the tube off with my knife in case of going into trees or rocks.) Though I thought about the bailout oxygen bottle, I knew I was below 10,000 feet and dismissed the idea. (Next time I'll pop it and not touch my mask until the chute opens.)

Pulled my visor down, pulled my elbows in as tight as they would go and grabbed the face curtain without any difficulty. In this position I looked at the broken clouds below me and reviewed my

procedures about three times. I yelled "Pull!" as loud as I could to tighten my stomach muscles.

I didn't feel any intermediate point in the curtain travel and never did feel the seat lift—felt as small and compact as a spinning golf ball—didn't feel any windstream. Heard three or four definite fluttering sounds. The curtain was ripped from my grip and an instant later I was looking at the canopy. "Where was the opening shock everyone talks about?" I thought.

Quickly took off my oxygen mask and ceremoniously dropped it. Unloosened my chin strap, took off my helmet and shot it out and down like a basketball. It disappeared into the blackness—I listened in vain for it to splash. (*The pilot should have retained his helmet.—Ed.*)

Tried many times to get back into the harness but couldn't—leg straps were too tight. Considered loosening them a little but when I remembered the wind was only 7 knots for the launch, decided to forget it. Unclipped my chest harness but couldn't reach the life raft retaining clip.

I looked at the lights from the ships in the distance and at the stars . . . silence and beauty all around me. Looked in the direction the plane must have gone in and thought "What a waste and it had my name on the side too!" Shuddered when I thought about the time and work that would have to go into the accident investigation.

After a while felt my feet hit the water so held my breath. My head went under only about two feet. Somehow I sensed which way the chute canopy would settle so I took a couple of strokes in the opposite direction with the harness off my shoulders. Came up treading water easily and inflated my life vest. Holding on to a riser, I unclipped both leg straps, then by feeding my raft lanyard through one hand, followed it to the raft. Got the raft out, popped some buttons, found a lollypop, put my hand on the cylinder and pulled. The cylinder startled me by becoming so cold so quickly.

With one flip I was in the raft. Turned on my vest light and took out a signal flare. Zipped the flare up in the thigh pocket of my flight suit with my gloves. I slid my 12 cartridges along my John Brown belt over my stomach. Took out my .38 and was ashamed to note that never had gotten around to putting a piece of parachute shroud line on the butt. My revolver had an empty chamber under the pin and the next one empty. The other four chambers were loaded. Restrapped my revolver in my holster and tried to pull my survival pack into the raft. It resisted with such weight that for the time being I abandoned the attempt.

Intermittently between the slight swells I could see the lights from three ships. The wind was very light. Decided to save one flare and four tracers to use if a ship was going to pass by abeam. Assigned top priority to the second flare, regardless of how imminent rescue might be, to prevent a ship from running me down.

Lit my first flare and held it high, knowing this would increase its range about two miles. After it burned out, I continued studying the ships' lights and spaced my tracers by my watch. Fired tracers only when an aircraft was in a reasonable position to see them. There were many aircraft at about 5000 feet. The low props were very far away.

Because the lights were visible an increasing percentage of the time I knew the ships were coming right for me. Wouldn't have been discouraged if they had gone away—had thought about the dye marker and the MATS flights into and out of Lajes plus the search aircraft. Anyway, some smart Portuguese fisherman would probably find me what with all the fish attracted by my white light making such a commotion all around.

Decided to take it easy for a while. Clipped the vest light safety pin through the left wrist zipper of my flight suit so I could hold the light high as possible and still have it secure without tiring. Had been sending my name, SOS and other messages in Morse code. The SOS seemed silly but reasoned that it might be the only thing to keep me from being mistaken for a fishing boat by some seaman apprentice lookout fresh out of boot camp. I figured that anyone knows an SOS. Continued flashing light intermittently to conserve the batteries and yet still give a reference position for plotting. Now and then fired a tracer until got down to reserve.

Saw starshells going off all over but not nearby and became a little perturbed. Thought if they had me in sight they would fire them over my head and slightly beyond me but they were throwing them all over. The shells seriously reduced the relative brightness of my little flashlight and my tracers. Saw port and starboard running lights of the ship which had changed relative bearing the least. Had my vest light clipped to my left wrist and my .38 held high in my left hand and my right thumb through the ring of my second flare. I knew I had many minutes before ramming would ever be a consideration so I was ready any time now to fire the flare.

It's human nature for anyone to look where a starshell goes off and those that were away off in azimuth were hurting me. They were probably crossfiring because there was a ship's track approaching to pass to my left, one dead ahead and one to the right. Finally, a perfect starshell went off over my head and slightly beyond me without any other starshells around. Knowing that all hands would be looking at that starshell, I fired my

second night flare. The destroyer dead ahead turned a spotlight towards me and I started blowing my whistle. I could hear orders being given to lower the boat. Bridge personnel on the destroyer said later they heard my whistle about 2 miles away.

Knowing that the destroyer should be practically dead in the water, I turned my back to it. Our safety officer had recently installed red and white reflective tape stripes on the helicopter lift harnesses of our life vests and I wanted to see how effective it was. (It was reported highly successful.)

I kept on blowing my whistle and holding my light high. When I heard them close aboard I expended my last two tracers. Rescue launch personnel said the whistle was invaluable in differentiating my white light from the white light of the destroyer to the port and well in front of us. They said steering for the sound was foolproof.

I climbed into the launch which the crew handled smartly. The corpsman had a clean dry blanket in a waterproof plastic bag but I wasn't cold—the water temperature had been a very comfortable 80° The boat crew showed smart professional seamanship . . . we picked up the sea painter at 5 knots and the pelican hook from the falls was secured quickly and safely on the first try. ●

F8U EJECTION

THE ejection and events following seemed, at the time, to be almost in slow motion. I recall leaving the cockpit, but it was very smooth and with no impact or force. I ejected in an eyes-up, straight-backed condition. I remember next that the F8U was under me, going down, and the seat was about 2 feet from me. At first I was slightly on my back but came to a head-down, knee-up position. Then the parachute opened with considerable force.

When the chute opened, my hardhat fell over my eyes, the visor went down, and my oxygen mask came down around my neck. I immediately released the fitting and threw off my hardhat and oxygen mask. They hung by the tube; I didn't want to enter the water with this condition. I watched the aircraft hit the water and disintegrate. It was almost inverted in a nose-down attitude. I estimate the time from ejection until plane crash was approximately 10 seconds, no longer. Then I saw the aircraft canopy falling like a leaf about 30 to 40 feet from me.

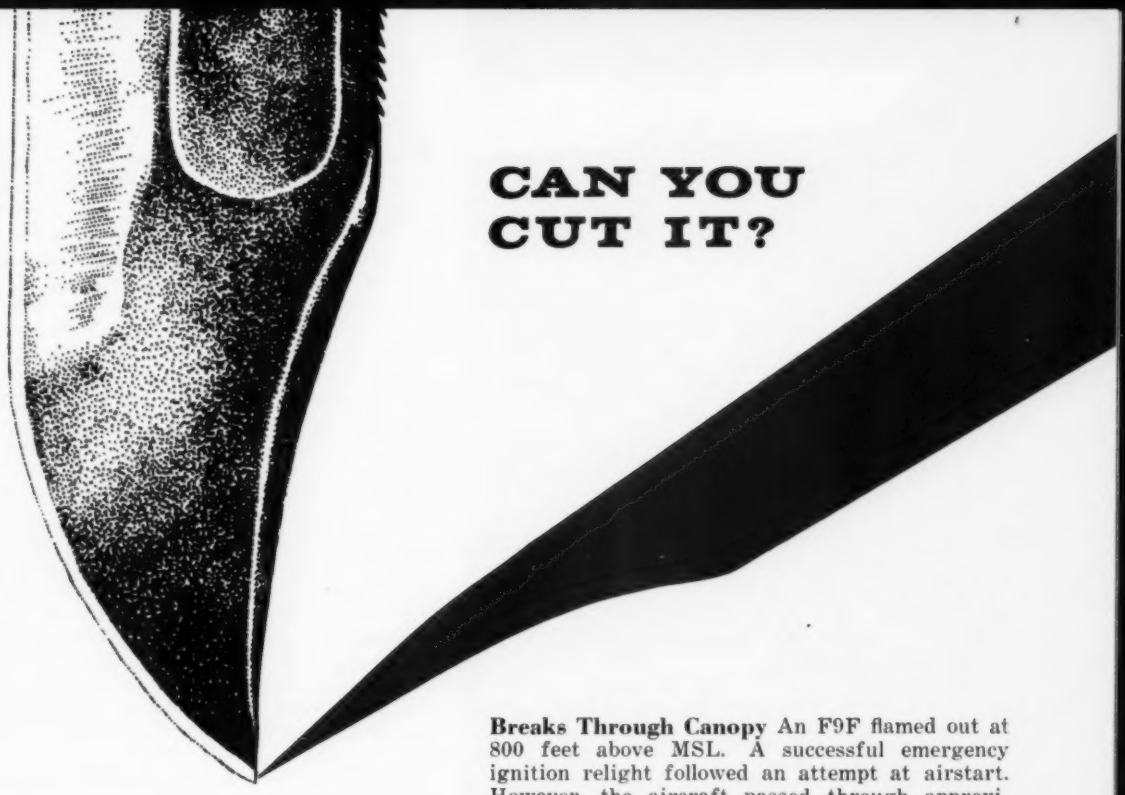
Then I unhooked the hardhat and let it and the oxygen mask drop. They fell approximately 3000′. My parachute descent was a very nice, non-oscillating smooth ride down . . . I pulled the manual D-ring and then I released the left leg strap. Pulling the raft and lanyard out of the seat pack, I hooked it to myself—I had an unreasonable fear of losing my raft. I took my kneeboard off and noticed I had lost my wrist watch. Looking down at the water, I saw movement. I dropped the kneeboard; it fell about 1½ seconds. With my hands on the rocket jet fittings, I watched the horizon. I entered the water and released them; I was immediately free of the parachute. I don't believe my head went under water more than inches. I came right to the surface before I had even inflated my life vest; then I inflated it. The seat pack was right in front of me. I released the raft and it fell out. The CO_2 bottle was right in front of my hand and I actuated it. The raft inflated and I climbed in.

I estimate I ejected at 4000 to 5000 feet. Also I estimate time in water before I entered the raft as 15 seconds. *I don't recall having to think about doing anything; it came as a reflex.*

After I was established in the raft, I saw an F8U circling. I fired a tracer from my .38 pistol in the air, away from the F8U. I knew they had my position fixed but I didn't know how long I'd have the F8U with me (low fuel). I got out my distress signals and dye marker. I put the dye out. I found a poncho in the seat pack and spread the bright side over me.

Then I busied myself looking over my survival equipment. I was surprised to discover I had lost none of my equipment except my wrist watch. I had thrown away my hardhat, oxygen mask and kneeboard. (Note: The hardhat should have been retained for protection against possible head injury in the rescue phase.) I had retained my .38 and bandoleer of ammo and my knife. About now, the F8U left me and I became aware of a very tired feeling and a loneliness that almost made me sick physically.

A few minutes more and the choppers came and I went home.



CAN YOU CUT IT?

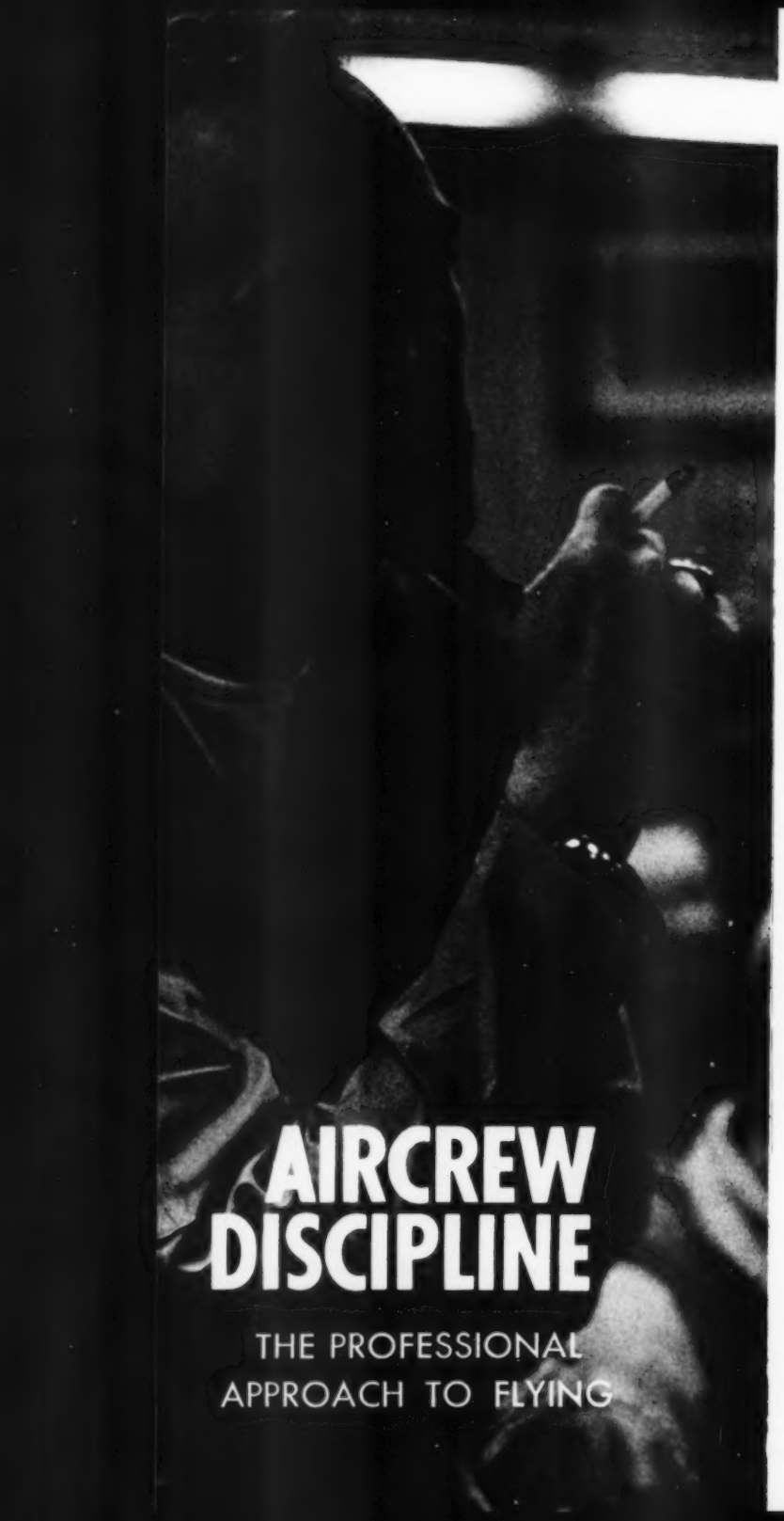
Cuts Flares Loose An F8U-2 pilot ejected over water on a night so dark that he couldn't see his parachute canopy during descent. After entering the water, he had "a little trouble" locating the raft lanyard in the dark but managed to find it, inflate the raft and climb in. (He had forgotten to attach his one-cell flashlight to his integrated torso harness and had lost his two-cell flashlight during ejection.) When he dug the flares out of the survival pack, he could not untie them and had to use his survival knife to cut the cord with which they were secured.

Punctures Ejection Seat Bladders As an A4D-2N pilot broke for a carrier landing he raised the seat for better visibility as he reached 600 feet and 140 knots in the pattern. The ejection seat harness release sear guard was secured only by its upper bolt and swiveled upward, leaving the harness release actuator firing pin sear exposed. The pilot's navigation bag on the starboard console had lodged against the exposed sear; as the seat was raised, the sear was tripped and the ¾-second delay cartridge fired. The pilot was released from the seat, the separation bladders inflated and he was pinned against the top of the canopy. Taking out his survival knife he punctured the bladders. He made his landing without further incident.

Breaks Through Canopy An F9F flamed out at 800 feet above MSL. A successful emergency ignition relight followed an attempt at airstart. However, the aircraft passed through approximately 15 lemon trees, struck a telephone pole, and after passing over a railroad embankment, landed wheels-down, flaps-up in the open desert. When the pilot's attempts to jettison the canopy by normal and emergency means failed, he succeeded in exiting from the aircraft after breaking through the plexiglas with his survival knife.

Cuts Shroudlines A pilot ejected successfully through the canopy of an F3H-2 at an altitude of 100 feet. When he entered the water, his legs and survival pack became tangled in his parachute shroudlines. Unable to disentangle himself after boarding his raft, he used his survival knife to cut himself free.

Helps Actuate Signal Flare A HUP-3 making a mail drop struck an air vent aboard ship and dropped to the deck on its side shredding all rotor blades; the bladeless rotor heads kept running and the helo rolled along the deck on the rotor stubs into the lifeline stanchions and over the side. The crewman escaped through the top of the helicopter where the rotor blades had ripped a hole. After inflating his life vest he tried to actuate one of his signal flares but could not lift the pull ring with his finger. With his survival knife, he pried the ring up and was able to set off the flare. Seconds after the flare burned out, a helicopter was hovering over him for the rescue. ●



AIRCREW DISCIPLINE

THE PROFESSIONAL APPROACH TO FLYING

The subject of Flight Safety gets great attention. . . . It is also a subject that keeps us humble —regardless of our sustained effort, we have not yet attained a safety record we want to live with.

The subject becomes all the more important and difficult in the days ahead as we plan to increase the percent of our aircraft on alert and convert them to more modern aircraft. At the same time, we must continue to train for conventional and nuclear delivery capability.

In developing some thoughts on this assigned subject, let us look at the aircrew of today. Let me start by giving you an example of aircrew discipline.

Last month at Osan, Korea an aircraft, on go-around from a GCA low approach, suddenly pitched down and crashed into the runway. The pilot, obviously fighting for his life, in the few seconds available took the time to press the mike button and transmit, "Frozen stick." This transmission provided the clue that led investigators to the cause of the accident and possible causes for some of the other unknowns. Subsequent recommendations should resolve the serious problem caused by locked controls in this aircraft. Discipline brings out the best in a man. This pilot's action was a manifestation of discipline and professionalism of the highest order. He was a busy man—he was undoubtedly aware of his peril. Yet, he took the time to describe his trouble to others. It was not a panic action. The pilot's voice recorded on tape was completely calm.

What is the state of discipline among aircrews today? Across the board, they are better trained, more responsible and more capable at present than at any previous time since man began to fly. Nevertheless, in a force the size of ours there always will be a percentage who need some extra attention and training and there will be times when a reduction in the quality of supervision will inevitably result in noncompliance or nonadherence to best safety practices on the part of certain individuals. I state a case in point. . . . Change of supervisory personnel recently seemed to infect some subordinate units with a disease I shall call "letdownitis." We had three accidents involving violations or noncompliance on the part of aircrews. Four aircraft and three pilots were lost as a result. These accidents occurred at a time when key commanders in the unit were being rotated or had just departed. Command supervision is absolutely essential in maintaining a position of constant readiness. There is no room for haphazard or poorly executed practices. Safety of the flight crew and the weapon systems must be of paramount concern to supervisors and commanders at all echelons at all times. Extraordinary measures

had to be taken to assure positive and heads-up supervision of all training, both on the ground and in the air.

We have inaugurated the supervisor-of-flying concept. The senior local commander is prebriefed each day on all scheduled flying. This briefing includes pilot qualifications; aircraft by tail number (to include a maintenance history of at least the previous five flights); mission to be accomplished (to include takeoff time, routes and altitudes to be flown); fuel reserves; alternates; landing times and weather (to include current and forecast, terminal, route, alternate and range); and any other factors considered pertinent.

Once the senior commander determines that the above are compatible with safe mission accomplishment, he will indicate his approval or change accordingly. To insure the close surveillance of the day's flying program subsequent to the briefings and approval by the commander, an appointed duty officer, not below the grade of major, is responsible for supervising the entire flying schedule. This officer acts as a clearance officer for the commander regarding schedule changes caused by weather, aircraft-pilot incompatibility or maintenance.

Given proper training and motivation, the aircrew will respond favorably. The aircrew is one of the strongest links in the safety chain and I feel that we as supervisors are really going to have to hustle to stay in the same league with them.

The other words in our subject, "Professional Approach to Flying," also point the finger at the pilot, but in our Forces today, it must encompass all people who support flying, from design engineer to the user. We have placed a most complex and difficult mission on our aircrews and their aircraft, and from both we demand maximum performance. When an aircrew errs in technique or judgment, for the most part, it is correctable; however, when the aircraft is at fault, we have a built-in accident potential. By far the most serious problem we've had is the repeated accidents caused by aircraft systems deficiencies of long standing.

Gentlemen, it is time that we apply "discipline" and the "professional approach to flying" across the board. We've reserved these words for the aircrew long enough.

To achieve the maximum performance from an aircraft engine, we carefully regulate the inputs of fuel and oxygen. For these inputs, under various environmental conditions, altitude and temperature, we expect a given and sustained degree of thrust. Get these inputs out of balance and literally your performance goes to pot.

The same is true for the delicate alignment necessary between mission requirements and mission capabilities. Far too often, we see higher headquarters demand "just a little more" in the form of flying hours or sorties, without due consideration of the wherewithal to produce. This overcommittment, gentlemen, is an accident-producing situation of the highest order and must receive the closest attention.

Specifically, we must insure that the safety foundation at squadron level is strong enough to hold the weight we intend to place upon it. Here, too, is an area where a balance must be maintained between input and ability to absorb.

This is a reality we must face up to, if we are to achieve a downward trend in aircraft accidents throughout the coming year. As our equipment becomes more complex, chances for error will increase. The demand for timely and correct actions will become more acute.

When an accident occurs, it is easy to say, "The pilot didn't know his emergency procedures," or, "Looks like the pilot didn't watch where he was going," or perhaps, "Poor technique." Frequently, the order of business is to place the full responsibility on the aircrew. We have checklists for every conceivable inflight failure. If a malfunction occurs, everybody else has fireproofed himself. The pilot has a slightly used parachute and/or a pile of bent aluminum. No matter what the emergency was, it's easy to Monday-morning-quarterback and trace the problem to the pilot. If the pilot hadn't had the emergency in the first place, half of our accidents to date, would never have occurred, as these were material failure induced.

The devotion, responsibilities, integrity, ethics and a trust of profession are not only that which is owed by the individual to the profession, but also, that which the profession owes the individual.

I am sure some of your commands are plagued with material problems in both new and old aircraft. Whether they be tires, flight controls, engine systems, or what have you, it behooves us all to quickly identify them. Then for you who can take appropriate action, let me encourage you to do so with accuracy and speed. It is only with this all encompassing "professional approach to flying" that we will see a dramatic reduction in the loss of our combat capability. *Adapted from USAF Safety Congress* ●

Your first night CarQual may bring moments of confusion in spite of APMs and briefings. Hang on and . . .

BELIEVE YOUR INSTRUMENTS

NINE of us mustered in the readyroom at 0900 and briefed for a flight out to the carrier for a scheduled night carrier landing qualification. The hop to the ship, the two day-landings and one cat shot went well with no sweat involved.

That night, at about 2000 we started briefing for the night qual hop. Five ADs were to go at 2155 and the rest to be launched when we were completed. The brief was fairly thorough although there were numerous interruptions.

The pattern around the ship was briefed to be a normal CV landing pattern except that the skipper said to be certain to go on instruments from the time we got on the cat until out of the upwind turn. We were to climb to 300-500 feet, initiate a 22-25 degree bank turn until on the reciprocal of the ship's course. Then we were to sneak a look for the ship but mainly fly instruments to the 180-degree position and even on to the 90-degree position until we could see the ship and start looking for the meatball.

Night taxi and catapult signals were discussed. Emergency procedures while still in the pattern were not covered although it was said that if someone got lost or went into the clouds to fly wings level and climb straight ahead to on top and call the tower for a vector back to the ship or to a bingo field.

The importance of flying instruments was reemphasized. The weather was reported as 1000 scattered with 8 miles visibility in haze and predicted to remain so until 0200 or thereabouts. It is my feeling that there was a good deal of tension and apprehension felt by all pilots, but I know that I experienced a great deal more than on any other brief prior to a carrier hop. Just prior to the time we manned aircraft, we were assured that the weather should hold good enough for carquals and that though there was haze in all quadrants, stars were visible overhead.

Aircraft assignments were just being made when we were called away to man aircraft. I had a plane erroneously assigned which was still ashore but flight deck control said 509 would be brought topside and I would fly that one. As we stepped out onto the flight deck two things at once became apparent—the aircraft were still in the process of being brought topside and spotted aft, and the second but most impressive finding was that the night was *black*, blacker than I could ever imagine.

This hop was my first night launch from a carrier and the opinion that follows is strictly that of one unfamiliar with night carrier flying. Even though we had been wearing our night-adaption glasses for about an hour prior to going out on deck, it was still extremely difficult to distinguish objects on the flight deck

and there was little definition between sky and horizon.

The order to start engines had already been given before my aircraft was finally spotted. I took my time preflighting and starting.

One AD was broken out of the pack and taxied forward to the starboard cat. A short time later I was brought out and taxied up. I felt I was being rushed but this may have been due to my excitement and state of nerves. The AD ahead of me was launched and I was brought into position. I tried to take my time going over my checklist and when I determined that I was ready to go I turned on my exterior lights and braced myself for the shot, keeping my eyes on the gages. I remember thinking at the time that the outside lights glaring inside the cockpit were very disconcerting.

The catapult fired and I received one of the greatest shocks of my life.

I was totally unprepared for the sensation which ensued. From the instant of the shot and for sometime thereafter I was on the very edge of vertigo. I had a great deal of difficulty in holding my heading and altitude. There was no horizon at all and even though I was trying to fly on instruments I found it very hard to force myself to do so.

As I said, this was my first night carrier hop and to say that I was a little frightened once I got airborne would be a tremendous understatement. At about 800 feet I found myself angling off to starboard trying to settle down on instruments. The lights from the tail were diffused by the haze and were bothering me quite a bit. From a position well to starboard of the ship I started a turn to downwind, swinging around on the 3-mile arc of the ship's Tacan until the needle indicated I was on the port side of the ship.

I called the ship and told them that I did not hold the ship visually but that I was on the 310-degree radial at 3 miles. A few minutes later I called abeam, using my Tacan to establish position since I still did not see the ship. The LSO waved off the AD ahead of me and then called me and said I was going low. I rogered but still did not see the ship.

Finally I saw a truck light and a wake which I thought to be the carrier but which turned out to be the destroyer bearing 190 degrees relative from the carrier. The tower called all aircraft and told us to turn our turtle back lights ON. This added light further confused me and added to my disorientation. I finally picked up the flush deck landing area outline lights of the carrier and started my approach.

Twice paddles called me for being low. I turned onto final still low and took my own waveoff. Following the waveoff I turned downwind, still more or less disoriented and fighting vertigo all the time. Again I approached what I believed to be the 180-degree position and this second approach was again erratic and low: I initiated my own waveoff.

Coming downwind for the third time I was still fighting vertigo but had settled down quite a bit. At this time the tower turned me over to CCA and told me they were going to vector me out to the starboard side of the ship to see if I could locate an aircraft which was unreported.

CCA vectored me 090 degrees but I failed to see anything. I was below the overcast and it was very difficult to maintain a good heading and altitude since I was trying to look out and fly instruments at the same time. Tower told me that CCA had me in radar contact and that I should gain a little altitude and see if I could see anything. I received a few more vectors, then CCA lost me for a few minutes.

Just prior to going into a cloud bank I saw an aircraft but was unable to identify him. Being stuck in the soup I leveled my wings, initiated a climb and told CCA I was climbing to on top. Around 3000 feet I was in the clear and received a vector back to the ship since my Tacan had spun out on me and was unreliable.

I passed over the ship and paddles said he saw me but when I dropped my wing to look down I could not see the carrier below the undercast. A few minutes later I was bingoed to the beach.

In retrospect, when we manned the aircraft, the weather may have been as advertised, but by launch time I believe it had deteriorated to marginal or below. There was no horizon at all, it was extremely hazy and visibility looked no more than five miles. The cloud cover varied from broken to overcast.

As mentioned previously, I fought vertigo from the time of launch until I climbed on top.

Admittedly, weather conditions contributed to the pilot's troubles, but deck scheduling is not likely to become easier and you have to use what you get. For a discussion of how to prepare for night CarQuals, please read the next article.—HEADMOUSE. ●

Overcoming those anxious moments of NIGHT

The night carrier approach pattern to a successful landing is one of the most sophisticated procedures demanded of aviators.

Admittedly, it is not an easy procedure to perform with precision; yet, it is not one which should be viewed with dire apprehension. Thousands of naval aviators have passed this milestone without undue difficulty. However, to the ill-prepared it can be an unforgettable experience filled with many anxious moments. These anxious moments are usually compounded by the degree of darkness of the particular night.

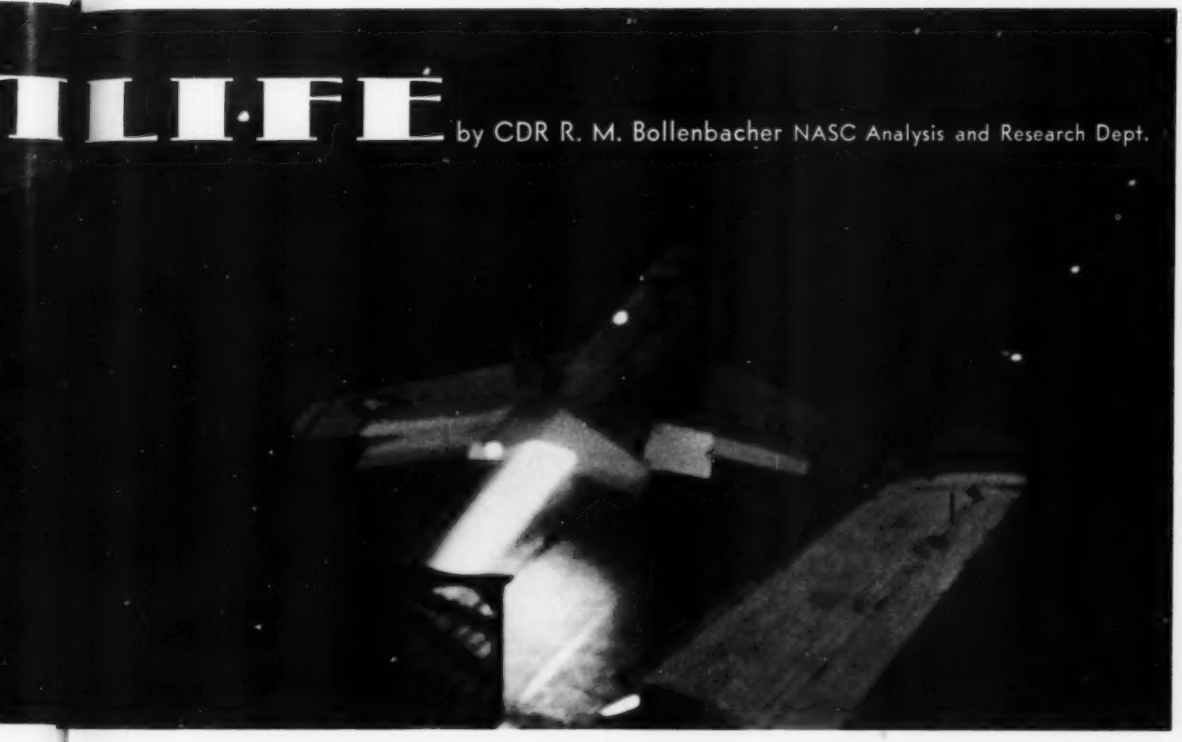
How do we prepare ourselves for this first black night carrier qualification flight?

Obviously, the training begins early in the career of a naval aviator and progresses toward a complete understanding of basic instrument flight with a demonstrative ability to make the aircraft conform to precise limits of control. Many hours of night flying are required to condition the pilot to his new environment—the cockpit must become a familiar home. As time progresses to where initial day/night carrier qualification is at hand, the tempo of training increases. Slow flight characteristics of the aircraft are thoroughly understood and slow flight is practiced at frequent intervals. Mirror landing patterns are simulated at altitude by visual reference to the outside horizon and by instrument references. Airspeeds, attitudes, power settings, angles of bank, transitions to and from the landing configuration—everything that is associated with MLP pattern is practiced at altitude *and* on instruments prior to commencing day mirror landing practice.

It is the opinion of this writer, and substantiated by many others, that initial MLP training should be predicated on instrument flight in order to better prepare the individual for initial night CarQuals. Unfortunately, a full moon is not guaranteed during initial night CarQuals. The pilot must be equipped to cope with complete darkness. For this reason night flights in preparation for night MLP should be conducted in areas devoid of artificial lighting. Initially, the total blackness will come as a distinct shock to the uninitiated. However, repeated flights into this new environment for basic instrument practice and pattern simulation will build this

TIL·IFE

by CDR R. M. Bollenbacher NASC Analysis and Research Dept.



confidence required for future night carrier operations. Additionally, the pilot must be able to remain oriented in the night carrier pattern through use of his navigational instruments. This, too, can be practiced ashore using a fixed navigational aid for pattern simulation and orientation.

Obviously, the above comments barely scratch the surface when applied to the overall training a new pilot must receive prior to night carrier qualifications. It is incumbent on those individuals responsible for training to teach and expose future carrier aviators to every reasonable eventuality he may encounter on his first night carrier flight. This can not be accomplished without a dedicated effort by those who have been through CV operations and still have vivid recall of the problems and anxieties encountered on their initial night CarQuals and subsequent flights. Every step of the way—from sounding of flight quarters to debriefing—should be covered in detail and repeated many times. If left unsaid, insignicant details often combine to produce additional stresses, anxieties and needless accidents. Ask the question, what occurred during the flight that was unexpected or not covered in the pre-carrier training plan? The answers may reveal weaknesses or omissions.

Successful completion of night CarQuals signals the *first* important step toward qualification as a carrier naval aviator. Ahead is the night instrument catapult shot, the IFR mission and the CCA recovery in heavy weather conditions. Ahead is all the preparations that are required to perform the mission in a professional manner. Ahead, also, is the well-deserved feeling of personal accomplishment and respect that comes with this acquired ability. It is not easy to attain this ability; and, it is just as difficult to maintain it at a high level of competence.

A thorough indoctrination in shipboard procedures coupled with extensive flight preparations ashore can eliminate many of these anxious moments associated with that first black-night carrier qualification flight. Proficiency in basic instrument flight is one of the keys . . . open the door and take a bundle. It is not guaranteed to eliminate all the sweat of black-night carrier operations but it surely helps. ●

HEADMOUSE

Air Flow Control

Dear Headmouse:

Your "Frostbite" article on page 32 of the Oct. 61 APPROACH was concluded with comments and recommendations to prevent any future occurrences of frostbite. The last of these comments suggested the possibility of changing the conditional air outlet which is located near the pilot's and bombardier-navigator's feet to divert or stop the flow of air in the event of an air conditioning system malfunction such as described in the article.

It should be noted that no mention was made of the fact that the A3D-1 and -2 aircraft have a manual control on the pilot's air conditioning console panel which allows the pilot to select the amount of air flow to his feet. This control operates a flapper valve in the diffuser outlet duct that can be positioned to increase, decrease or shut off the flow of air from the foot warmer outlet.

Since the article did not mention a malfunction of the manual valve, it is assumed that the valve was functioning satisfactorily. If this was the case, the question arises as to why the pilot did not use the control to shut off the flow of air to his feet. Had this been done he may not have suffered frostbitten toes.

W. C. GARRETT, CDR, USNR-R
El Segundo, Calif.

► The recommendation to move the air outlet was taken from the Flight Hazard Report which makes no mention of the manual control. Presumably, the pilot could have positioned the manual control to direct the air on the windscreen instead of on his feet. Then, if he and the crewmembers still suffered from severe cold, he should have aborted the flight, (since it was a non-combat operation).

In your investigation as a result of your letter, we found that the latest revision of the applicable HMI has no discussion or illustration of this manual control. Douglas is looking into this and the HMI will be revised.

Very resp'y,

Headmouse

Fight for Survival

Dear Headmouse:

The utilization and care of survival gear is a lost art in our Navy today. Too many persons in positions of responsibility are content to sift through reports on aircraft accidents, file them and wait for the next report. A look around the field would enable them to spot deficiencies and then take corrective action to insure proper maintenance, care and use of survival gear.

BuPers split the PR and AME rate and assigned oxygen, safety belts, fire bottles and associated gear to the AME who works out of air frames in some places and out of the parachute loft in others. A single AME performing all of the checks on squadron aircraft is not enough, especially when the remaining AMEs are working in office jobs. Consequently, part of the AME's task falls on the parachute rigger who already has parachutes, rafts, life vests, flight gear, oxygen regulators, oxygen masks and the associated gear which is normal to his rate.

Current operations require longer flights and more hours. Many times an aircraft comes out of check without the survival people realizing that it is intended to fly in the very near future. Consequently the survival equipment is not ready for flight.

It's time to initiate a large scale survival drive in the Navy and recognize the responsibilities of the parachute rigger's lifesaving job, but above all it's time for command to recognize that more riggers are needed in order to maintain the equipment which can save the lives of our aviation personnel. If these few points are driven home, we can save the medical departments and accident investigators many hours of unpleasant work.

ANYMOUSE

Canopy Escape Tool

Dear Headmouse,

Our command receives distribution on the USAF ADC Interceptor Magazine. I find many of their articles interesting and informative. The September 1961 issue has an article entitled "Through the Canopy in Seconds" which discusses the feasibility, technique and tools of a pilot for cutting his way out of a cockpit. The USAF has designed and distributed what appears to be a standard tool for this purpose.

Is the Navy developing such a tool or do they feel that our standard survival knife will be sufficient? I might note that the only demonstration of this escape procedure that I have witnessed utilized a surveyed F8U canopy and a

Have you a question? Send it to Headmouse, U.S. Naval Aviation Safety Center, Norfolk 11, Virginia. He'll do his best to help.

standard survival knife. The knife broke before the pilot had even cracked the plexiglas.

J. C. BROWN, ASO
MAG-11, 1st MAW

► In December, 1961, the Naval Aviation Safety Center received one of the USAF canopy escape tools sent through channels by Major J. M. Verdi, USMCR, TACRON 43. NASC forwarded the tool to the Bureau of Naval Weapons with the following comments:

"The proposed canopy escape tool appears to offer the advantages of accessibility at all times. It appears to offer a solution to the problem of unreliability of canopy jettisoning systems following an aircraft accident as well as accidental life raft inflation in the cockpit.

"The difficulty of locating a sheath knife so that it is readily accessible during flight as well as while being dragged through the water has long been recognized. In addition the problem of tempering a knife blade so that it will hold an edge under extended survival conditions and still not break while cutting through an aircraft canopy has not been solved with the available aviators' knives. It appears, therefore, that an additional item of equipment such as that proposed is required."

Your interest in making this suggestion to improve aviation safety is greatly appreciated.

Very resp'y

Headmouse

Acceptable Weight

Dear Headmouse,

Concerning the article "Overweight" in the October '61 APPROACH, I would like to comment that while its main point was well taken, it tended to support the very popular belief among aviation personnel that they may weigh up to the maximum for height and age and pass an aviation physical examination. I would like to present my reasons for objecting to this belief by the following example:

The minimum, standard and maximum weights for a 5'10" 28-year-old pilot are 139, 155 and 194 lbs. respectively. In effect, the Navy is saying that for some people of this height and age, 139 lbs. is acceptable, and that for other people 194 lbs. is acceptable. No one is trying to say that 155 lbs. is ideal for all aviators of this age and height. I ask you to think about a somewhat slight 5'10" 28-year-old pilot who, at weight 145, is in ideal physical condition. There are many such pilots. Now he begins to overeat and increases his weight to 190 lbs. complete with flabby muscles and a beer belly. As far as I am concerned, this pilot will not pass his physical examination until he is at an acceptable weight. That is, it must be well distributed and in proportion to age, height and *skeletal structure*. This is a matter of judgment on the part of the flight surgeon. Such a man who is ideal at 145 is, let's face it, sloppy fat at 190.

In my view, no one can feel safe regarding his weight simply because it is under maximum. He must be at a weight acceptable to his flight surgeon. If there is any doubt, it behooves him to see his flight surgeon in advance of his physical examination. I have never known the pilot who, when asked to state the weight he thought he should maintain, found any disagreement with the flight surgeon. The flight surgeon applies his judgment and training to the application of physical standards.

FLIGHT SURGEON

► If, in his opinion, the pilot is not physically qualified, the flight surgeon sends the completed physical examination forms to the Bureau of Medicine and Surgery for final action. It is an uncommon occurrence for the flight surgeon's recommendation to be reversed.

Very resp'y,

Headmouse

Passengers' Seat Belt

Dear Headmouse:

Recently, I took my trusty HUK-1 from the beach out to one of the new carriers for a passenger pickup. Two passengers climbed aboard and were thoroughly briefed by myself and the *plane captain* on pertinent ditching procedures.

The hop back to dry land was uneventful and after I shut down at the line I headed toward station ops. About two minutes later I looked at the helo and saw one passenger still sitting in his seat. I went out to see what was wrong and found him fiddling with the seat belt, trying to get loose. He had locked the belt with the locking pin on the snap-release and was unable to get it open again.

If we had ditched the aircraft this passenger would undoubtedly have gone to the bottom with it. Frequently we have to pick up passengers when there is only enough time for a quick briefing and they have to do some of the strapping in themselves. It seems to me the standard type used in the cockpit would be safer than those with the seat belt locking pin. What do you think, Headmouse?

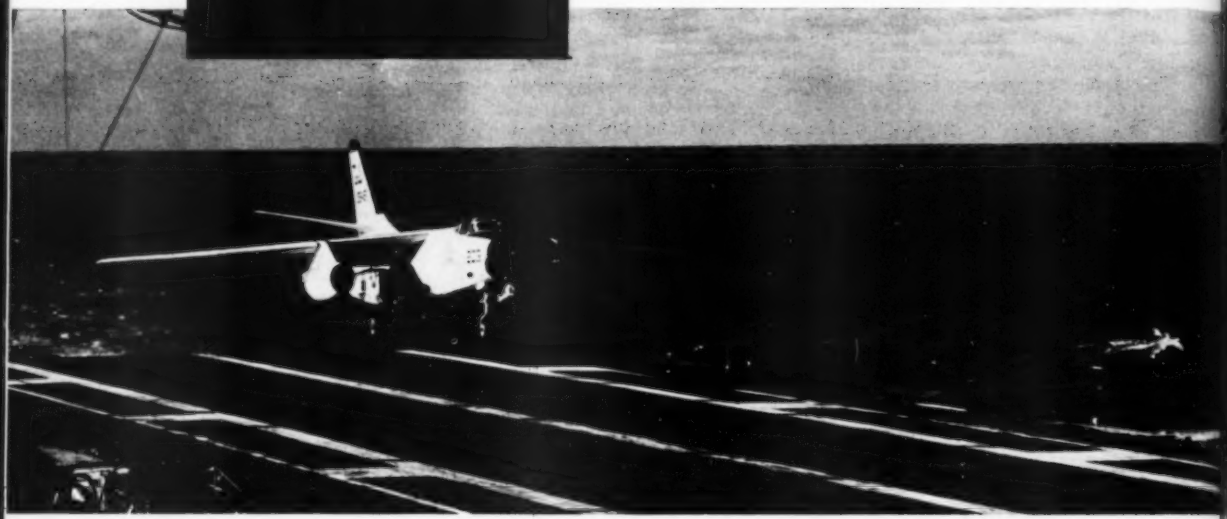
● To begin with we can't imagine what a locking pin device was doing on the snap-release of a lap safety belt used for passenger restraint in an HUK unless the gunner's belt (NAF 502134) which normally allows free movement in the passenger compartment was altered by being made into a restraint type belt. The Helicopter "Crossfeed" of 31 July 1961 sounded a warning on this particular booby trap. There is no question—the gunner's belt (NAF 502134) with the locking pin safety device should not be used for passenger restraint.

Very respectfully,

Headmouse

KNOW YOUR EMERGENCY PROCEDURES

Courtesy Lt W. W. Powell, ASO, HATron 3, NAS, Sanford, Fla.



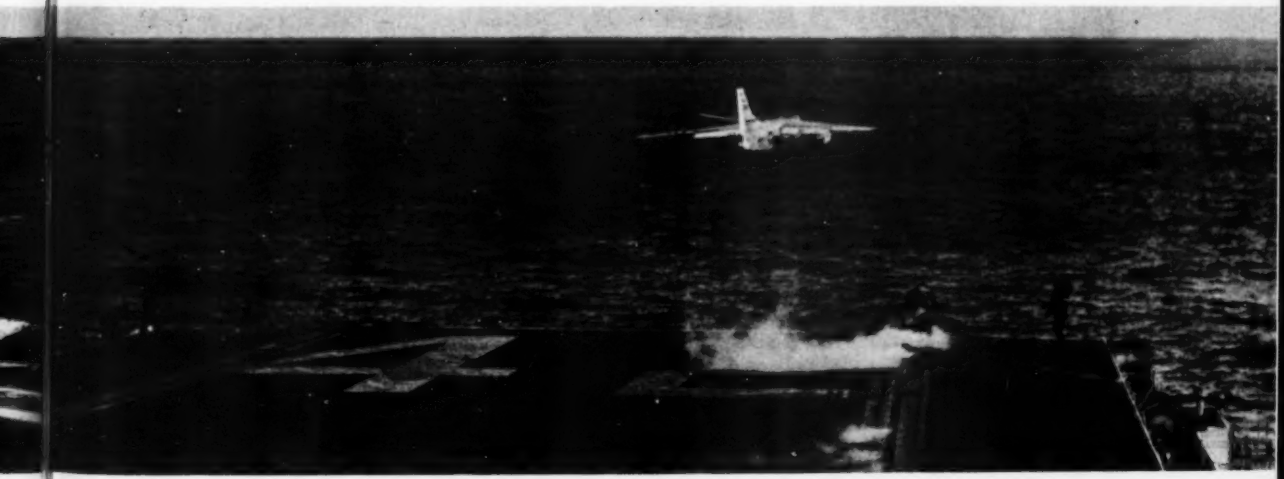
The approach was normal—Good Attitude— On Speed—On Glide Path . . .

As p
Noti

Slightly left—Attitude at touchdown good—HOOK SKIP!—BOLTER . .

As power was **ADDED**, starboard engine began to unwind—
Notice pilot beginning to roll **INTO** the **GOOD** engine . . .

Pilot maintains flight by **KEEPING ON TOP OF THE GOOD ENGINE** . . .



Gear Coming Up-Everything's Under Control There's no substitute for knowing your **EMERGENCY PROCEDURES** . . .

I had a HEART ATTACK

The following story, from a recent USAF Flight Safety Kit can be related verbatim to illustrate two points of interest to all service personnel:

(1) It can happen to you, and (2) If medical attention is sought early, the condition may be detected early in its course and in the individual's life expectancy.

Now to the Commander's story

. . . . . .

I haven't been at work for the past two weeks and to dispel the comments of my friends who have said, 'He just got a bundle from his rich uncle and isn't as conscientious as he once was!' or 'He's serving 30 days on a driving rap' or 'His wife clobbered him and he's recovering in private,' and many other unrelatable statements, I am forced to make a statement. I had a heart attack.

It all began about a week ago at work with a kind of sharp pressing pain, deep center left high up in the chest cavity. After a time it subsided and I thought 'Just some of that rib roast lunch acting up—better cut down a bit.' That evening after the usual cocktail, leg of lamb dinner and my favorite, apple pie and ice cream, the pain began all over again, persisted and gradually and painfully extended to my left arm and hand.

The Doc was called and he came to the house with his gadget bag. Pulling a stethoscope out of this satchel he listened, probed, listened again and two minutes later announced my blood pressure was 250. Seems as though this is a fairly good bowling score but appears unacceptable as a blood pressure figure. Just moments later, four husky men loaded me on a little rollaway bed and toted me off to the hospital. Here they sized me off and issued me a tent-like nightie that wasn't properly designed. The tent ties around the neck, came together with spare material, but further down there just was no chance for a successful tie-down.

Heart attack! The term has always held an awesome tone of finality to it, but I finally managed to muster courage to ask the Doc. "At the moment," he said, "It appears that you have a coronary." (And, I've always associated the word with coroner). I just knew it could never happen to me—friends I have lost to heart attacks but they brought it on themselves by overexertion, and all who know me have long suspected that the word "overexertion" would never have been associated with me. But now I have joined the ranks of those who have had a heart attack. And that's just what it was —the Docs have checked, probed, punched and photographed all of the vitals known as lungs, liver, kidneys, colon and several other goodies that I can't spell or even pronounce. All these vitals have been pronounced as sound as possible after years of wear and tear.

But more news—still hard to take—was to come. "We'll have to cut the weight 30 pounds, absolute rest is necessary." This pronouncement could mean only two things—no more mashed potatoes and gravy; no more pizza, barbecued ribs or good things to eat. No more of those midnight parties or early morning duck hunting trips.

"You're going to have to trim up this body as well as the activity ol'boy," I said to myself. Besides we'll have to sweat out whether or not there was permanent heart damage.

They didn't ask me, but I could have provided a long and interesting list of heart damage that occurred through the years. There was the time, for example, when Miss Dahlman, my beautiful fifth grade teacher, explained that she was being married to another—and that other heart rending experience when Shep, my favorite puppy, was trampled under the thundering hoofs of a runaway team and was ceremoniously buried under the elder

trees. Maybe of little significance, but the organ must have been damaged by the heartburn following a party. Tumultuous flip-flop certainly caused strain of the heart when a voice at the other end of telephone announced, "This is an investigator for the Internal Revenue Department." And, of course, there were those occasions when the heart was near bursting with the loss of someone near and dear.

During the last week I have become an expert on heart attacks. Seems as though there are two major kinds: a coronary thrombosis, which is a clot, and is usually severe and dangerous. The other is known as angina pectoris, like mine. It affected me with sharp jabs of pain in the upper middle chest area, these sharp spasms extended through the chest, down the left arm to the tips of my fingers. There can be injury to the main (coronary) artery, the heart walls or valves. And these symptoms are frequently the result of squeezing or strangulation of the heart or artery—sometimes brought on by a huge bulge of the lower abdomen—frankly an out and out big stomach.

It's revealing to learn just what an 800 calories per day diet can do in the way of figures. First there is the item of 20 pounds—most of it gone from the vicinity of the waist line. And the figure represented by silhouette—well—when it can be displayed—no longer will it be a spectacle for pity and apology. Then too there is the figure represented by $ which will add to the wealth and welfare of my tailor who will have a major project in recutting all the clothing I possess.

Most of all I am grateful for this second chance. For years the Doc has advised trimming down the mid-section. For just as long—the Commander of my household has cajoled, ridiculed and denied my gastronomical demands. Up until this time the joy of eating food deafened my ears.

Today, I am a *believer*.

Obesity—if present for many months or years always causes complications, statistically increases the mortality rate and lowers life expectancy. At age 45-50, the elevation *above* the *average* death rate is as follows:

10 Lbs. overweight	8%
20 Lbs. overweight	18%
30 Lbs. overweight	28%
59 Lbs. overweight	56%

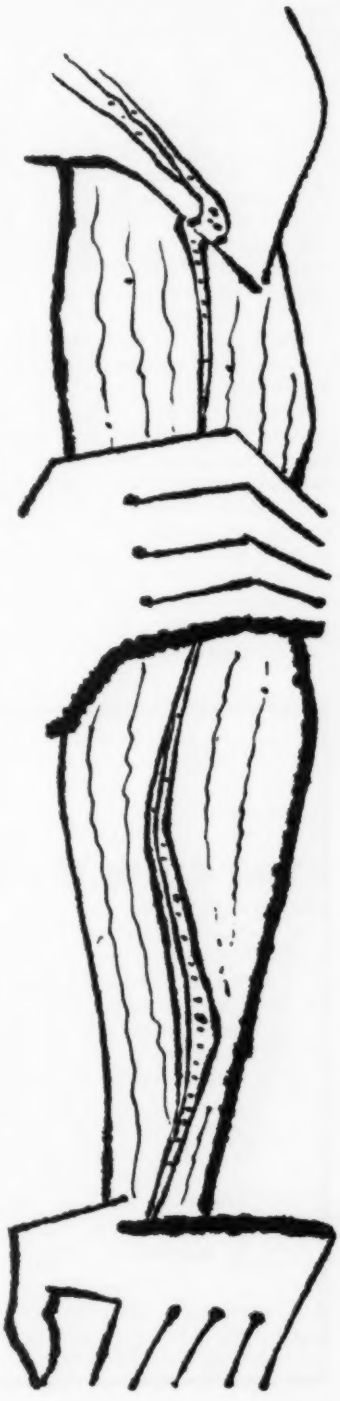
Obese persons succumb to cardio-vascular-renal (heart, blood vessel, and kidney) disease about 60% more frequently than those of normal weight. Being overweight will also result in higher death rates from diabetes, nephritis, pneumonia and post-surgical complications. Even deaths from accidents or suicide is considerably more common in the obese, due to psychological factors. Other complications include high blood pressure, arthritis of the back and knees and varicose veins.

It should be needless to remind aviators of the additional difficulties presented in escape from aircraft, discomfort due to a tight fit in the cockpit and the increased chance of aero-embolism (bends, decompression sickness, etc.). This latter condition is related to age and body build. In general, the occurrence of symptoms increases with age, or with the ratio of *weight to height*.

If the cause can be discovered, proper treatment instituted and the cooperation of the patient secured, the results are excellent in early obseity but, in cases of long standing, complications may continue despite weight loss.

Inasmuch as the great majority of military personnel are in relatively good physical condition, factors such as heredity, glandular disease and other causes of obesity present a minimal problem.

Whenever a tendency to obesity becomes evident, proper eat-



ing habits should be established, and moderate regular exercise encouraged. The value of exercise in weight reduction is limited. Activity stimulates the appetite—and it takes a walk of 2½ miles to consume the energy represented by one slice of bread. Diet restriction is always necessary no matter what the cause of obesity. Many of us can easily lose weight by simply abstaining from bread, potatoes, sweets and alcoholic beverages.

When there are no fresh vegetables, you can usually get them in the can.

Usually the first signs of excessive weight, other than obvious appearance, are those of fatigue, shortness of breath, leg or backache or painful feet. Diet sheets are available from your flight surgeon. designed for either a rapid or slow weight loss, guaranteed to give results—provided you have the intestinal fortitude to comply with them.

Just to confuse you a little—don't go overboard on reducing. It does require medical supervision, and a constant gradual small weight loss (about a pound a week) is preferable to a "crash" program. We are convinced that "non-feeding" or irregular eating habits over an extended period contribute to fatigue, human error and possible aircraft accidents. The human body should be refueled just as regularly as the aircraft you are flying.

Overweight????? For each ten pounds of weight in the human body, 100 yards of blood vessel are required. An individual ten pounds overweight therefore, adds a tremendous increment to the workload placed upon the heart.

Keeping in shape mentally and physically has always been intrinsic to our military way of life. President Kennedy's physical fitness program for the nation highlights the problem as it affects those of us in uniform. We are expected to set an example in appearance, behavior and deed for others to follow. So emphasis on this matter of proper weight has never been more opportune. *Excerpts 2nd MAW, The Hot Dope Sheet* ●

Throwing Your Weight Around

It depends upon which *authority* discusses the subject, but one nice round figure of 20 million has been used to denote the number of Americans carrying from 5 to 20 pounds of overweight around with them. *Don't* go on a crash diet, but watch the small things like that extra spoon of sugar and extra cream in your coffee.

A reducing diet consists of 900 calories per day.

P.S. For proper diet see your Flight Surgeon

You Write The Caption

HAY THERE!—"You with your scoop in the hay." Please help this unfortunate out of his predicament and give him a caption. Post him on your squadron bulletin board or route him through the unit so all hands can contribute a caption. Send them to *Approach*—we will print the best ones with credit in a future issue. While you're at it send along some safety suggestions, too.

Second Time!

As the AD-5W was fired off the catapult, the tension ring broke as the catapult fired and the aircraft began to move down the track. After the first few feet of normal travel, sparks were observed coming from the shuttle area and the aircraft swerved port, straightened out continued over the side. For the air controller in the right front cockpit it was as if the whole thing had happened to him before . . . and it had. Here is his story:

When it became absolutely apparent that we were about to go over the rounddown, the pilot announced over the ICS, "We're going in." The chief answered "Roger" and I thought, "Oh no, not again." I was destined for my second night ditching within five weeks.

We dropped over the edge in a steep dive, left wing slightly down. Impact in a 60-degree nose-down attitude was severe. From the sudden flood of sea water into the open cockpit I assumed the aircraft had either flipped over or had started to sink immediately because of the full fuel load, but the plane remained upright. Quickly I unfastened my lap belt release buckle and stood up to leave.

It was at this point that I probably tripped the canopy actuator handle. The canopy closed around my waist and there I was standing in the cockpit —trapped. I am not too proud to admit that I panicked. I began shouting for the pilot but my screams were muffled by the crashing wake and engine noises of the carrier which was now passing so close I could almost reach out and touch it.

Only when the ship was well clear did I attempt to force the canopy open and climb out on the starboard wing. I inflated my life vest and dove for the water. However, my troubles were by no means over for the night. Something held me back and kept me from swimming away from the stricken plane. I could see by the carrier searchlight that the free end of my pararaft lanyard was tangled in the cockpit. I pulled on the lanyard but it wouldn't come loose.

Swimming back to the aircraft I climbed onto the wing, sat down and tried to unsheath my survival knife to cut the lanyard. Everything was so saturated and covered with oil that the whole slippery effort was futile. I had one recourse if I didn't want to go down with the aircraft: abandon the chute entirely and the pararaft with it. I did so. Just as I leaped clear of the plane again, it nosed over and began to sink.

Now I became aware that the pilot was calling for me. I acknowledged by inquiring about the chief and learned that he had made it too. I couldn't see either one of them. We were in total darkness, and the waves were cresting at about 10 feet.

Within a few minutes we had rendezvoused around the pilot's inflated life raft. I climbed aboard to investigate what seemed an intense pain in my right leg. As it turned out, I had only an abrasion and minor bleeding. By now the chief's raft was inflated. I was reluctant to ignite a signal flare because there were densely concentrated amounts of gasoline in the water. When we drifted away from the debris and began using our signal devices, our efforts to attract attention resulted in a veritable field day. We all fired our .38 tracer pistols, ignited our flares and blew our whistles. I even released shark chaser for good measure.

When the plane guard destroyer seemed to be coming from the wrong direction, I realized that I had become disoriented. Each time we dipped into a trough, the ship momentarily disappeared. As the DD maneuvered into position for the pick-up, the steady beams of the searchlights were intermittently broken by short flashes, indicating to us that we had been sighted.

Within 25 minutes of our accident the DD was alongside. Floatlines were thrown toward us and we were pulled into a rope ladder over the ship's side. The pilot was the first to try to climb the ladder, but the extreme roll and pitch of the ship made it too difficult. My previous experience with this phase prompted me to request an improvised sling. One was quickly lowered and we were all three hauled aboard. ●

Fuselage Emergency Signals

notes from your flight surgeon

A THREE-MAN ordnance team was arming an FJ-3D on the duty runway. One man was strapped on the port side and the other two men on the starboard side. The two on the starboard side finished their work, unstrapped themselves from the plane and walked away. The third man was still working on the port side. The senior ordnanceman cleared the pilot to taxi forward. Thinking he was armed and ready, the pilot began to taxi slowly to the takeoff position. As the aircraft began to move the ordnanceman who was still strapped on the port side realized what was happening and apparently in trying to jump clear, slipped and fell under the port main gear. The port wheel ran over his thigh and inflicted fatal injuries.

Subsequent to the accident, there was considerable discussion as to what the ordnanceman could have done to alert the pilot to the situation. It was generally agreed that by beating on the side of the aircraft with a wrench or even with his bare hand, a man in this position could attract the pilot's attention and the latter would then shut down the engine.

A squadron pilot and an ordnanceman conducted a test in which the ordnanceman beat his hand on the side of an FJ-3D2 cockpit while the engine was turning up at 100% rpm and TACAN signals and UHF radio transmissions were being received. The pilot stated that the sound of beating on the fuselage was like that of beating on a drum and that the sound could definitely be heard at any power setting up to and including full power.

The investigating flight surgeon made the following recommendations in the MOR:

- When possible, use a safety watch whose responsibility it is to see that all personnel are clear.

- If a safety watch is not feasible because of lack of personnel, require that all personnel involved cross under the aircraft and join the senior man before a thumbs up is given.
- Make certain that all personnel understand that tapping on the aircraft as an emergency measure will usually alert the pilot to difficulty.

High-Viz Suit

ON an afternoon in February a TF-1 crashed into the water off the carrier after a bolter and engine failure. The pilot was wearing a high visibility flight suit. Flight deck personnel stated he was seen much more easily than was the copilot who was not wearing such a suit.

Bright Sunlight

IF you're headed for the beach or if you plan to work outdoors in the yard this weekend, don't get all your suntan at one time. And be sure to wear your sun glasses.

A bad sunburn or a mahogany tan acquired too quickly can cause irreparable damage to your skin. Some medical authorities are of the opinion that a deep suntan can lead to skin cancer; certainly, most doctors will tell you that a deep suntan toughens, dries and ages the skin. Remember that a suntan should be developed in easy stages and that reflected sunlight can tan and burn even on a cloudy day.

Besides the dangers of too much sunburn too fast, intense sunlight can have a cumulative and adverse effect on dark adaptation and night vision which can last for several days. If you are scheduled for night duty, wear your sun glasses at the beach, on the golf course, in your backyard or on the flight line. . . whenever you are in the bright sun.

End of Cruise Complacency

AT a recent carrier air group safety council meeting, a squadron safety officer reported he had observed LqOX personnel working at the carts without gloves, goggles and helmets. A general feeling of complacency usually appears during the latter stages of a cruise, he noted. All pilots, plane captains and maintenance personnel should realize that the cruise is not over until the last aircraft is safely ashore.

Underwater Breathing

When braking failed to slow an A4D-1 on landing, the aircraft rolled off the runway, over a sea wall and stopped inverted in 15 feet of water. Although the pilot had failed to blow the canopy, it came off in the crash and he was able to escape. Making no attempt to use the underwater breathing feature of his oxygen equipment, he took a deep breath just before the cockpit became submerged and did not breathe again until he surfaced.

Training in all emergency procedures and correct utilization of safety and survival equipment, including oxygen systems, must be repeated and repeated. If luck had been against the pilot and the canopy had stayed with the aircraft, his life might have depended on breathing oxygen underwater until escape or rescue.

Sticky Fitting

COMMAND policy requiring squadron pilots to check rocket jet fittings for ease of operation and report any malfunction as a down discrepancy on the yellow sheet probably saved a pilot's life in a recent A4D ejection.

After ejecting over the ocean about a mile offshore and safely landing in the water, he released his two shoulder rocket jet fittings without difficulty. In itself, this would not be remarkable except for the fact that *on the preceding day* he had griped one of the fittings as "sticky" with a tendency to jam. The "stickiness" was corrected by a thorough cleaning after which the fitting was actuated several times until ease of operation was considered satisfactory. This same command requires replacement of the entire riser assembly if the fitting has excessive play or binds.

Results: Elimination of a potential hazard in successful water survival after parachute descent.

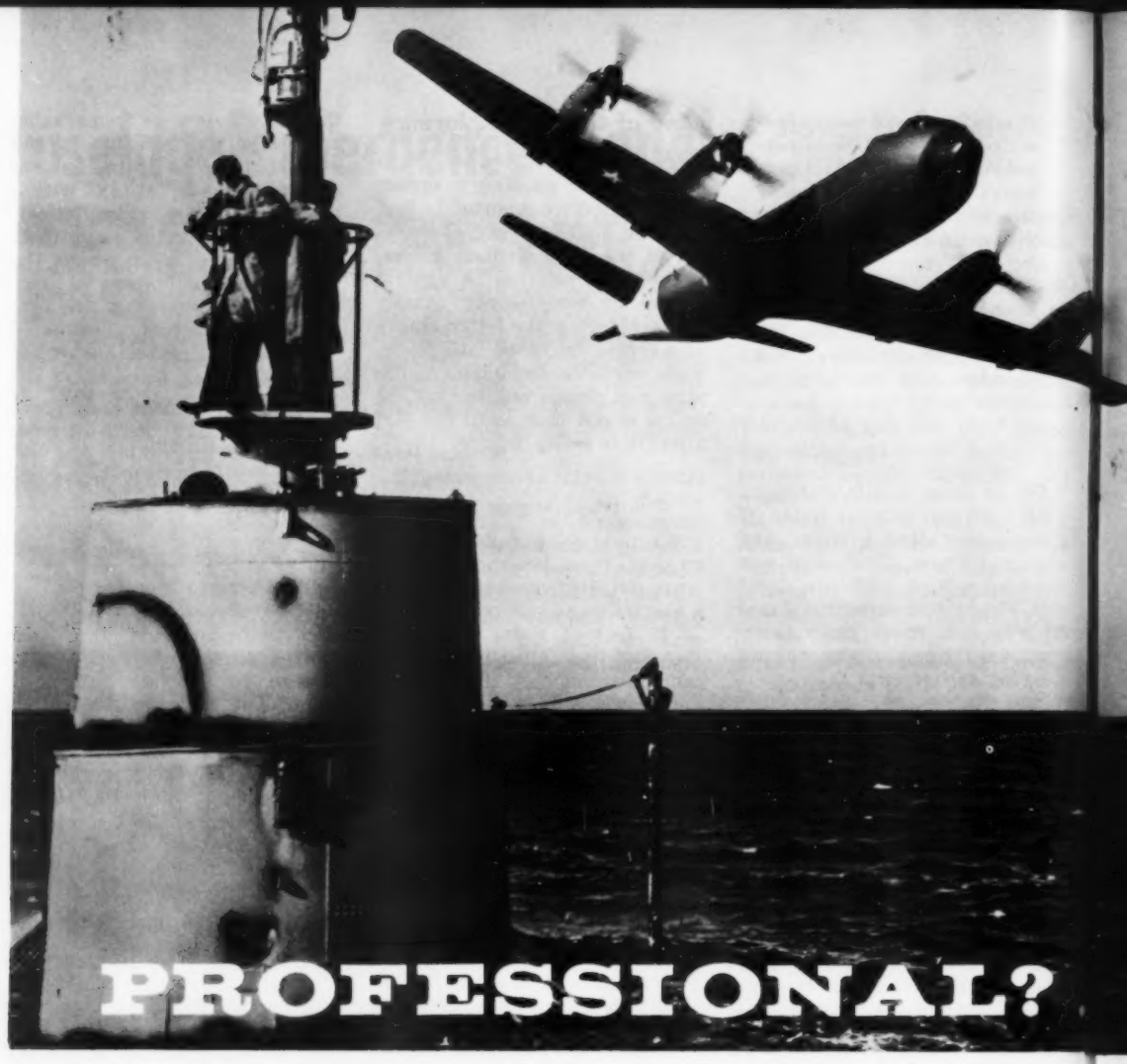
Radio Beacon

THE airfield operations officer advised that a crash drill was recently held utilizing the standard parachute or survival radio beacon to simulate a downed pilot. The radio beacon worked perfectly and aircraft were able to pick up the signal and home effectively. Result was a highly successful drill indicating the potential value of the beacon as a rescue aid.—*2nd MAW-Safety Council Minutes*

Flight Suit Sleeves

WHEN an HUS-1 crashed inverted and burned, the copilot escaped through the open side hatch. Shielding his face from the intense flames with his left arm, he felt his way with his right as he crawled through the flames. Just as he got to his feet outside, the wreckage exploded and knocked him down. He got up again and ran clear, then rolled on the ground to extinguish his burning flight suit. Hot transmission oil which had spilled on the copilot before he escaped from the cockpit had considerably increased the flight suit's combustibility.

The copilot had rolled both sleeves up above his elbows because of the hot weather. His most severe burns were on his forearms. ●



PROFESSIONAL?

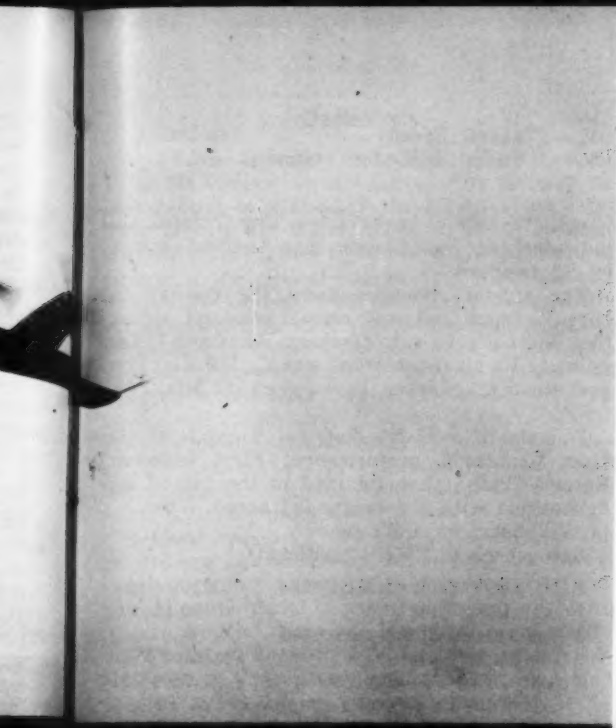
Each and every Naval Aviator considers himself a professional, and justifiably so in most instances. However, there are some voids.

One rather widespread void made itself known to me at the O-Club at Navy Jax. The joint was jumping-old pros and young pros were flying all over the Happy Hour Bar. A conversation close aboard caught my ear. A middle-aged fighter pro asked a multi-engine type "What is this V_1 you people talk about?" The response was quick, confident, and partially correct; "That's the speed we need to get off with one engine out." "What is V_2?" was the next query. You guessed it, our multi-pro stated "That's the speed we need to get off with two engines out."; obviously not an R4D driver.

The following is written to make easy the assimilation of the basics of takeoff performance and the pertinent terminology; and, it is hoped, demonstrate the desirability of using such information.

The advent of large multi-engine aircraft in the Navy, with more to come, such as the P3V, coupled with the military gross overloads not infrequently encountered, make it essential that the aircraft's capabilities be known prior to application of full throttle for takeoff.

A by-product, not without value, is the ability to speak knowledgeably on the subject and the terms involved. The terms used by commercial operators, the Federal Aviation Agency, the aircraft manufacturer and some renegade naval aviators, are V_1, V_2, Refusal Speed, First Increment Rate-of-Climb, and others. For some reason,



When refusal speed is less than V_1 it is an indication of what?

By
CDR William S. Webster, Jr.
NATTC Glynco, Ga.

Takeoff Performance Data

Buno_____ Gross Weight_____
Pilot Computing_____ Date_____

Conditions

1. Altimeter Setting/Pressure Altitude	____"/____'
2. Runway Temperature (A1-7)	____°F/____°C
3. Dew Point (A1-7)	____°F/____°C
4. Wind, Headwind Tailwind Comp. (A3-4)	°/____Kts/____Kts
5. Runway Length/Slope	____'/____°

Takeoff Data

6. BMEP—Predicted/Minimum/Max MAP (A3-1)	____/____/____"
7. Density Altitude (A1-10) or Aerology	_____'
8. Distance to Take Off (A3-5)—Predicted/Actual	____'/____'
9. Refusal Speed (A3-7)	_____Kts
10. Acceleration (A3-8)—Speed at 2000'—Predicted/Actual	____Kts____Kts
11. V_2 (A3-9)	_____Kts
12. V_1 (A3-10) If V, exceeds refusal speed (item 9 above) flight must be operational or load reduced (A3-9)	_____Kts
13. BHP/Eng = 2900 × BMEP/236	_____BHP
14. Pwr Loss/Eng—(3250—item 13 above)	_____BHP
15. 3-engine First Increment Rate-of-climb Corrected for Density Alt (A4-10)	_____fpm
16. Pwr Deviation Correction (A4-11)	_____fpm
17. Corrected 3-engine first increment rate-of-climb	_____fpm
18. Best Airspeed for 3-eng rate-of-climb	_____Kts

the Navy has not used these terms and has substituted others with similar or identical definitions, i.e., Critical Airspeed for Engine Failure and Takeoff Speed.

V_1, as defined by the FAA, is the equivalent of "Critical Airspeed for Engine Failure." It is the airspeed attained on all engines, from which in the event of failure of the critical engine (usually No. 1), the aircraft may be decelerated (with optimum braking, without reverse); to a stop (if critical field length is available), or acceleration continued on remaining engine(s) and takeoff accomplished *in the same distance* (as stopping would have taken).

If V_1 is to have any significance, it must exceed minimum control speed and *critical field length* must be available. V_1 varies with power available, density altitude, gross weight, wind and runway slope. Runway length is *not* a factor; critical field length is *assumed* to be available in the computation of V_1. Critical field length must be computed separately.

Critical Field Length is the total length of runway required to accelerate on all engines to critical airspeed for engine failure (V_1), from which the aircraft may be decelerated to a stop, or acceleration continued and takeoff accomplished in the same distance.

For the Navy, "takeoff" means breaking ground with zero obstacle clearance; FAA stipulates a 50-foot obstacle clearance as an integral part of their definition of critical field length. Therefore critical field length for them is somewhat longer than ours. Critical field length varies with power

available, density altitude, gross weight, wind an runway slope.

Refusal Speed is the maximum speed to which the aircraft can accelerate and then stop in the available runway length without use of reverse pitch. Note that *no* mention is made of takeoff; refusal speed has nothing, of itself, to do with becoming airborne. It is *not* V_1! Attaining refusal speed prior to a malfunction does *not* signify that takeoff can be accomplished with an engine out. It does signify that from that speed you may abort without reverse; and conversely, that from a speed in excess of refusal speed an abort will require the use of reverse to remain on the runway.

Refusal speed varies primarily with runway length. It may be less than V_1 on a very short runway, more than V_1, and less than V_2, or it may exceed V_2 on a long runway. Refusal speed also varies with power available, density altitude, gross weight, wind and runway slope. Refusal speed will equal V_1 speed only *if* the aircraft is loaded to the maximum safe takeoff weight for a given runway length, a purely coincidental relationship.

V_2 is arbitrarily defined by the FAA as 1.2 times power-off stall-speed in the takeoff configuration for aircraft with 2 engines and 1.15 times power-off stall-speed in takeoff configuration for aircraft with more than two engines. The Navy calls it "Takeoff Speed." Only one variable is involved: weight. It is lift-off speed with or without an engine failure, and best airspeed for an emergency rate of climb with *all* engines operating.

Now we are all set to go. We know all about takeoff performance. Deliver a *Connie* to Burbank? Look out Hollywood here we come! The *Willie Victor* looks good. The crew is sharp and well organized—a bunch of old pros. Sure we'll take passengers; fuel, and weight are no problem. We will gross 135,000 pounds.

The following conditions ought to sound familiar at a number of places, Jacksonville, for example:

Altimeter setting	29.82″
Runway Temp	30°C
Dew Point	25°C
Wind	Light & variable
Runway length/slope	8000′/O°

With the above information from Ops we can compute V_1, refusal speed and V_2 using the Manual as follows:

BMEP—Predicted/95%/max	
MAP	252/239/52.2
Quite a power loss but heat hurts.	
Density altitude	1900 feet
Imagine Jacksonville at 1900 feet.	
Distance to take off	4850′
No problem, we have 8000 feet.	
Refusal speed	112 kts
OK	
V_2—(Takeoff Speed)	123 kts
V_1—(Critical A.S. for engine failure)	100 kts

Great, it's nice to have V_1 less than refusal, that indicates we have more than critical runway length available.

The aircraft trundles down the runway full bore, V_1 comes and goes, refusal goes and just like that No. 1 engine auto feathers. What now? Keep going to V_2, no sweat. What was V_2, 123 Kts; there goes the 2000′ marker, here comes 123 Kts, LIFT OFF!

Will she lift off? It's doubtful. There is another facet to takeoff performance; First Increment Rate-of-Climb (that obtained in the takeoff configuration) with one engine feathered. What is it in this instance? Let's see.

Going back to BMEP predicted:

BHP/Eng − 2900 × BMEP/236	3100 Hp
Power Loss/Eng	150 Hp
3-Eng rate-of-climb corrected for density alt	100 FPM
Power Deviation Correction	−75 FPM
Corrected 3-Eng rate-of-climb	25 FPM
Best Airspeed for 3-Eng rate-of-climb	129 Kts

If the engines produce 252 BMEP, *if* the weight is no more than 135,000 pounds, *if* the aircraft doesn't suffer degraded performance from use and age, it will climb 25 fpm at 129 kts gear-down and flaps at 60%. At V_2, 123 knots the rate-of-climb is ZERO.

What happens if the three good fans are down a little and only put out 248 BHEP? Power loss per engine is 200 Hp — Rate-of-climb is zero at 129 Knots, and going faster *decreases* rate of climb. Ninety-five percent BMEP was 239; here the power loss is 300 Hp per engine. While you are in the book checking the figures, note that the 8000-foot runway will permit takeoff grossing 148,000 lbs. The first increment rate-of-climb with one engine feathered under the above described conditions is positively negative. At best climb speed, 132 Kts rate of climb is *minus* 165 feet-per-minute.

It becomes obvious that explicit information concerning capabilities and limitations of the aircraft is desirable if we are to become *old* pros.

Never fly that heavy? Perhaps not but there are by-products of such computation. You will detect early a sick engine or an out-of-rig aircraft and you will sound like the professional you are, in the bar and in the seat.

Here is a suggested format for the described computation. The parenthetical figure numbers provide ready reference to the Flight Manual in the case of WV aircraft.

Definitions

V_1 (V-one speed): As defined in CAR Part 40, V_1 is the equivalent of Critical Airspeed for engine failure as defined in the Flight Manual for Navy Models WV-2 and WV-3. It is the airspeed attained on 4 engines from which (in the event of failure of the critical engine No. 1) the aircraft may be decelerated (with optimum braking, without reverse) to a stop (if critical field length is available); or acceleration continued on 3 engines and takeoff accomplished in the same distance (as stopping would have taken). It is a specific refusal speed for an aircraft loaded to the maximum gross weight permitted by effective runway length. Note that for practical use V_1 must exceed minimum control speed; 84 knots for WVs with 3 rudders and 97 knots for WVs with 2 rudders.

Refusal Speed: The maximum speed that can be attained and then stop the aircraft on the remaining runway without use of reverse. A function of many variables, it varies primarily with runway length. It may be less than V_1 on a very short runway, more than V_1 and less than V_2 or greater than V_2 on a very long runway. Note that *no* mention is made of completing a takeoff.

V_2: (V-two speed): Arbitrarily defined in CAR as 1.15 power-off stall-speed and is lift-off speed for 4 or 3 engine operation; it is a function of weight alone.

When refusal speed is less than V_1 it is an indication that:

1. Critical runway length is *not* available.
2. That reversal *will* be required to abort after refusal speed prior to takeoff.
3. The flight should not go unless operational requirements dictate a takeoff at a gross weight in excess of that indicated by runway length available (A3-9).

When refusal speed is greater than V_1 and less than V_2:

1. Engine failure prior to refusal speed dictates an abort; after refusal speed indicates a continued takeoff.
2. Takeoff may be aborted using reverse after refusal speed prior to lift-off as a matter of pilot judgment.

When refusal speed exceeds V_2:

1. Common sense and prudence indicate an abort with any failure prior to V_2.

Heavy takeoff weights, high density altitudes and moderate power losses can result in a *negative 3-engine rate-of-climb* in the takeoff configuration. No indication of this condition will be revealed by computation of V_1, V_2 and Refusal Speed. Flight under this condition will be avoided whenever possible. It should be noted that a loss of only 8 BMEP across the board will reduce 3-engine rate-of-climb (takeoff configuration) by 50'. Thus, it can be seen that prior to rolling for takeoff the pilot *must* know: V_1, Refusal, V_2 and, when marginal, First Increment 3-engine rate-of-climb. ●

Pilot Quiz
(For The Morning After)

Meteorology

1. Should airline pilots be paid by the Beaufort scale, for overtime?
2. Who is qualified to tend an isobar when installed in a transocean airliner?
3. Which members of the pilot's family are affected by relative humidity?
4. When ice changes to water, how does it involve the latent heat of confusion?
5. What parachute equipment should be worn during flights where adiabatic changes occur?
6. How does a stable atmosphere affect horsepower?
7. Do air masses refer to religious services conduced aloft?
8. Can a pilot having normal lapse rate, pass the Class 2 physical examination?
9. Will an aneroid operation prevent a pilot from passing a physical exam?
10. How can adjustable seats improve the pilot's sea level?

Navigation

1. Is a rhumbline the shortest distance between two isobars?
2. Can a navigator collect insurance for dead reckoning?
3. What type of lubrication is recommended for radio bearings?
4. How many petals are found on the compass rose?
5. While holding a heading of 360 degrees, might one be considered as a hot pilot?
6. When will the meat shortage affect an airway beacon?
7. What has pilotage got to do with the date of an aviator's birth?
8. What bank is required to pass a pilot check?
9. What method is employed to prime the Greenwich meridian?
10. What cooling effect will a fan marker have on temperature along the airway?

—Courtesy "Quadrant"

For the want

MUGS!

Wheeling and dealing yellow equipment is this lad's game. He's got a knack for *squaring* things—yep, towing gear with the brakes LOCKED really squares wheels.

t of a nail

The old story goes that for the want of a nail, the shoe was lost . . . the kingdom was lost because of the lack of that single nail.

Transposed into modern language, for the want of a starting unit, the aircraft was lost, and the situation can be carried on to the point of jeopardizing the security of the nation. Recently, a squadron was forced to cancel night flying commitments because there were no units available to start their aircraft. Actually, there were two units which were operable, but none of the operating personnel were well enough trained to ascertain this fact. What if this flight had been vitally necessary to intercept enemy aircraft, or provide counterstrike capabilities?

Limited Capabilities

Those familiar with the GTC-85, which is the gas turbine compressor used to supply pneumatic power for the air turbine starters mounted on jet engines such as the J-57 and the J-71 may not know the GTC-85 does not supply enough power to start impingement type engines such as the J-79 in newer aircraft. The Navy is now in the process of purchasing starting units which in-

RCPP-105 detachable pod, minus its nose cone, on ground handling trailer, may also be carried by aircraft.

RCPT-100 is a storage-battery-driven self-propelled trailer.

GTCP-100, below, installed in an MD-3 diesel tractor.

corporate the GTCP-100-51 or -52 engine. There are three configurations with this engine installed:

1. RCPP-105 detachable pod which may be carried by the aircraft or installed on a ground handling trailer
2. RCPT-100 which is a storage battery-driven self-propelled trailer, and
3. MD-3 diesel tractor with the GTCP-100 enclosure.

These units provide pneumatic power for starting, AC and DC electrical power and air conditioning for electric compartment cooling. Personnel who have been associated with the GTC-85 are surprised when they find out that these new units are a great deal more complicated to operate and maintain.

Down Time Cause Factors

There are several contributing factors which explain why these units are out of commission for extended periods of time:

Scarcity of the Units.

Scarcity of trained maintenance personnel.

Scarcity of replacement parts—these are nearly non-existent, and in most cases require long waiting periods before they are received.

Scarcity of technical data—publications on the units have not been received and most information must be obtained from the factory representatives who work with the shop personnel.

Lack of proper training of personnel operating the units. Many of the units sent to the maintenance shop are out of commission because of operator negligence or lack of knowledge of proper operating procedures. Here are some examples:

One unit was towed with the brakes set. This resulted in the hard rubber wheels being worn off on one side and the unit was lost to the squadron because no replacement wheels were available.

One unit was turned up with a panel in place over the oil cooler fan. This resulted in excessive oil temperature and the unit was lost to the squadron until the oil was changed and the strainers checked for metal particles. Fortunately in this instance, the engine, which costs $40,000 was not damaged.

One unit was towed with the power cables dragging on the ramp. The unit was lost to the squadron for several months until a new AC power cable was received through supply. Special cables are required.

Many units that are sent to the shop maintenance require only new batteries. Properly trained operators would recognize the symptoms and correct the trouble on the squadron flight line.

In a recent case a unit was downed one evening and the shop notified the following morning. When the man from the shop arrived at the squadron

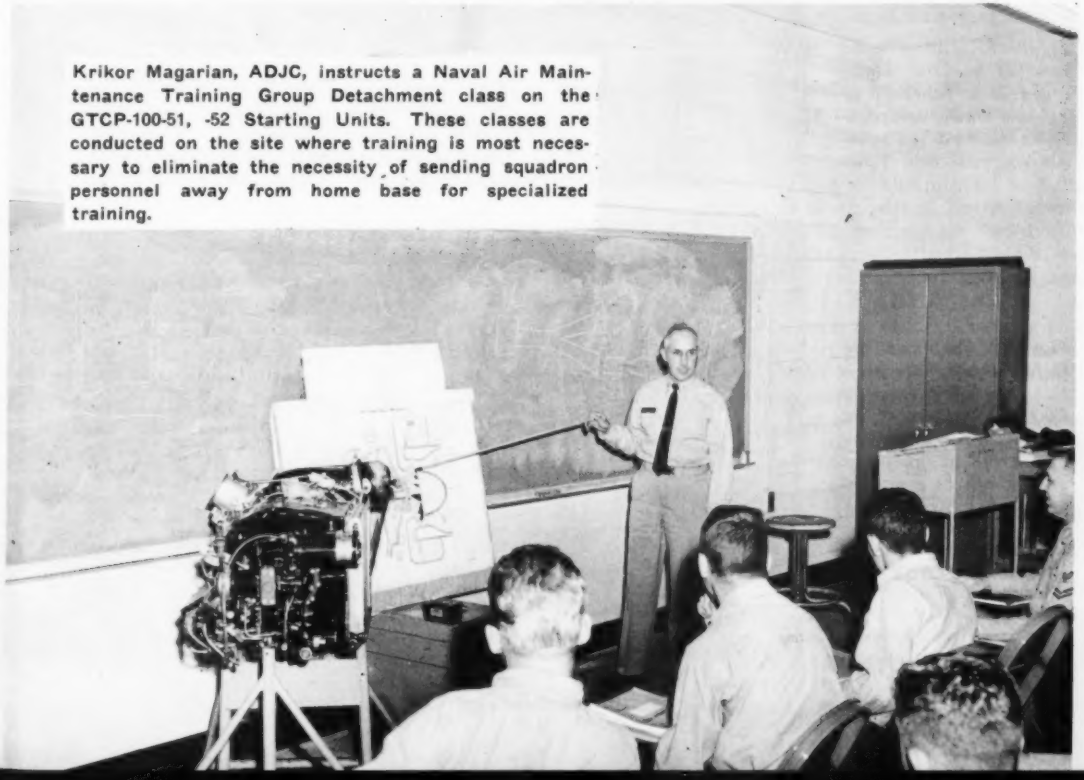
flight line, the unit was being operated by other squadron personnel who said that nothing was or had been wrong with the unit. This was one of the units which could have been used the evening that night flights were cancelled. The other unit which could have been used was down simply because of a low battery.

A fire bottle was left lying in the path of the exhaust from the gas turbine engine. The fire bottle exploded due to the high temperature of the exhaust blast. Fortunately no personnel were injured or equipment damaged.

Improvement Areas

Not much can be done at the shop or squadron level about the scarcity of units, parts and publications. Publications are now being printed for distribution and new parts will become more plentiful as the Navy buys more units. The area that is wide open for improvement is in the training of additional personnel to work in the shop and to initiate a more rigid training program for flight line personnel both on the *operator level* and more importantly on the *supervisory level.* In the past, very few chief or first class line petty officers attended the locally conducted two-day operation and familiarization course conducted by NAMTraGru. Observers point out that lower rated personnel do not observe proper procedures when they know that the chief or first class is not thoroughly familiar with the equipment. Properly trained operators will insure that the units are not damaged due to negligence, will increase the operating life of the units and reduce the work load on the shop so that units may be repaired and put back into commission more rapidly.

The Naval Air Maintenance Training Group operates special training courses, on the site, in this type, and all other types of aviation equipment and aircraft. These schools are located in the area of greatest demand, so that there will be a minimum of lost time away from the working area. Many squadrons have the attitude that time away from the shop or the flight line is costing them man hours. However, the axiom of the Naval Air Maintenance Training Group will adequately express the situation: Maintenance Training doesn't cost, *It pays!* Many lost man hours, lost equipment hours and much needless damage and extraneous maintenance will be avoided if properly trained personnel are available. NAMTRAGRU Area Officers in Charge are located on all major Naval and Marine Air Stations, and the Headquarters Section is at the Naval Air Station, Memphis, Tennessee. Inquiries regarding training on any specific equipment may be directed to either of these activities, and a giant stride will have been taken in the right direction. ●



Krikor Magarian, ADJC, instructs a Naval Air Maintenance Training Group Detachment class on the GTCP-100-51, -52 Starting Units. These classes are conducted on the site where training is most necessary to eliminate the necessity of sending squadron personnel away from home base for specialized training.

TEMP·TIME·THRUST

"There is no operational technique that can reverse the effect of creep!"

ENGINE life, or an engine operating time between overhaul, depends on the length of time engine components can function properly. Engine manufacturers recognize that engine life can be shortened by improper handling and have, therefore, imposed limits on the allowable exhaust gas temperature for various phases of engine operation. The limits must be observed if a longer life is to be expected.

One of the main purposes of the temperature limits is to protect the moving parts in the hot section of the engine, primarily turbine blades, from the effect of creep. The rate of turbine blade creep increases with increasing engine RPM, exhaust gas temperatures and high blade loadings caused by the exhaust gases as they flow across the turbine blades. Figure 1 shows how the rate of turbine blade creep is affected by an increase in

EXHAUST GAS TEMPERATURE — (EGT) C —	HIGH PRESSURE COMPRESSOR — RPM (N_2)	CREEP
500	92%	1 unit per hr
580	94%	5 units per hr
620	97%	50 units per hr
653	98%	2500 units per hr

Figure 1. Approximate rate of turbine blade creep as a function of exhaust gas temperature, engine (N_2) compressor rpm and time.

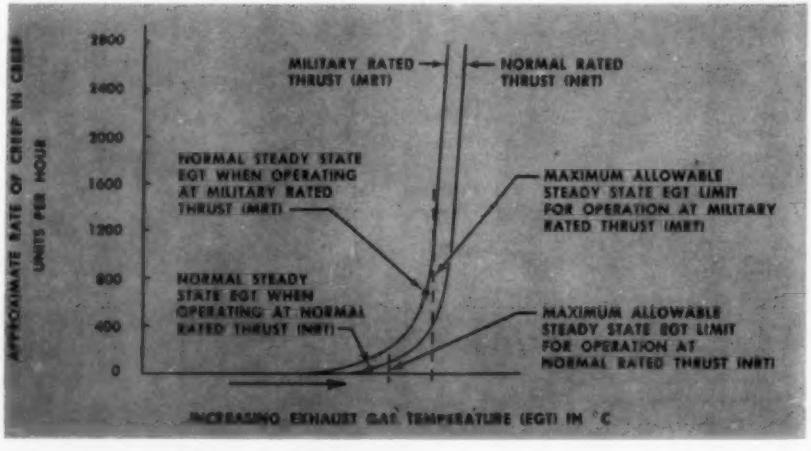

APPROXIMATE RATE OF CREEP IN CREEP UNITS PER HOUR
2800
2400
2000
1600
1200
800
400
0
MILITARY RATED THRUST (MRT)
NORMAL RATED THRUST (NRT)
NORMAL STEADY STATE EGT WHEN OPERATING AT MILITARY RATED THRUST (MRT)
MAXIMUM ALLOWABLE STEADY STATE EGT LIMIT FOR OPERATION AT MILITARY RATED THRUST (MRT)
NORMAL STEADY STATE EGT WHEN OPERATING AT NORMAL RATED THRUST (NRT)
MAXIMUM ALLOWABLE STEADY STATE EGT LIMIT FOR OPERATION AT NORMAL RATED THRUST (NRT)
INCREASING EXHAUST GAS TEMPERATURE (EGT) IN °C

Figure 2. Turbine Blade Deformation Rate as a Function of Increasing EGT for a Typical Jet Engine. Note: At any given rate of creep the engine can be operated at a higher EGT at NRT than at MRT, because the RPM and turbine gas pressure at NRT are lower than at MRT.

the EGT and engine RPM:

Although Figure 1 does not show measurable quantities, it does show how elevated temperatures affect turbine life. For example, if this engine was run at 655° C, the turbine blades would elongate 2500 times as much per unit of time as they would if the EGT was limited to 500° C.

Figure 2 shows the rate of turbine blade deformation or creep and how it is affected by an increasing EGT for a typical jet engine when operated at two different thrust ratings.

As can be seen from the curves in Figure 2, the maximum allowable steady state EGT limit (established by the engine manufacturer) for operation at either of the two illustrated thrust ratings is higher than the corresponding normal steady state operating EGT at the same thrust rating.

The thrust rating at which a jet engine is operating (which determines the RPM and turbine blade loads, as well as the temperature) is the real measure of how much punishment an engine is taking. For this reason, the time limit for any given engine thrust rating applies to the use of the thrust rating, and not as is frequently supposed, to the length of time that the engine may be operated at the maximum allowable EGT for that particular thrust rating. The EGT indicator provides the pilots a "how is the engine operating" parameter, rather than an indication to be used for judging what the engine output should be. Except when it becomes necessary to reduce a throttle-setting to avoid exceeding a temperature limit, EGT should not be used as a means of setting thrust on some engines.

Flight personnel should limit to a minimum the time when operating at the high thrust ratings such as military rated thrust (MRT) and takeoff rated thrust (TRT). When it is necessary to operate at the high thrust ratings, the time of operation should not be prolonged any more than is necessary to accomplish the immediate objective.

It is possible that an engine could be operated continuously at MRT for up to 50 hours before a sufficient amount of turbine blade stretch would occur and necessitate replacing the engine. It is also possible that the engine could be operated at MRT for a 30-minute period each flight for 3000 hours before the engine would require replacement. Since an engine can be operated at the high thrust ratings only for a certain number of hours it is, therefore, normal to distribute the hours throughout a period considered to be the reasonable life of the engine. Hence MIL specifications specify time limits at MRT. The following passage is quoted from Pratt and Whitney Aircraft Gas Turbine Operation Information letter Number 10, revised August 31, 1961:

"There is no operational technique that can reverse the effect of creep. Neither will conservative

Deleterious effects of blade stretch is stressed by Mobile Training Group jet instructors. Vice Admiral Fitzhugh Lee, Chief of Naval Air Training, is briefed by ADJCs John Hughes, and John Freeman.

engine operation repair internal damage which may have already occurred because of previous disregard of operating limits. The real purpose of limiting the time for engine operation at Takeoff, Maximum or Military Rated Thrust is not so much to permit a cooling period between intervals of operation at high thrust (although such a cooling period is very desirable) as it is to provide a suitable distribution of the rate of creep and deterioration of hot section parts throughout an engine's normal life. There is no hard and fast rule for coming out of afterburning or for reducing the throttle setting to Normal Rated, when operating at Military, for any specific length of time before the higher thrust rating may be used again. This is a matter that must depend upon the pilot's judgment, squadron doctrine, the policy of regulating authorities or the urgency of the mission at hand. Obviously, nothing is to be gained by reducing a thrust setting for only a moment or two before repeating the setting again, just to be able to say that a thrust rating was not continuously used longer than the specified time limit.

"Whenever the situation permits, it is very good practice to operate an engine at reduced thrust, between periods of operation at Maximum or Military, for the same amount of time that the engine has just been operated at the higher thrust setting. It has been shown that the more conservative the engine operation, the longer the turbine blades will last and the longer will be the time between overhaul periods. There are just so many operating hours at high thrust in every engine.

"Whether they are used up quickly or dispersed evenly throughout a normal, calculated period of time all depends upon how closely and conscientiously the time and EGT limits are observed."

—Adapted from Boeing "Service News"

approach

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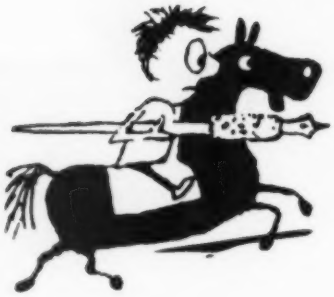


LETTERS

The Way Things Are

GTMO—Upon reading your article "A Study of Fuel Systems" in the March issue, I cannot help wondering if the picture on page 36 was purposely posed to show how not to fuel an aircraft. There are several outstanding discrepancies that are not in line with what is recommended here at the Fleet Training Group at GTMO.

First, it is quite obvious that the nozzle was not grounded before being attached to the aircraft.

Second, ball caps are not on the list of authorized flight deck clothing as they make excellent FOD.

Third, goggles are issued to flight deck fuel crews to prevent serious damage to the eyes that can and has been caused by JP fuel. The other man in the picture does not seem to have a hat or goggles but does have another source of FOD, a loose pencil dangling from his shirt.

If this was a posed picture it is an excellent one. If not, then this picture has no place in your fine publication.

R. B. BRESLIN, ABFC
Aviation Fuels Supervisor
Fleet Training Group

• You've got us Chief. Seems that pictures showing everything as it is *supposed* to be aren't to be had. Perhaps our readers can help by posing the photos properly. The photo may look awful but here's the caption as received: "Operating with the 6th Fleet in the Med. Fuels crew refueling an A3D of . . . . . on flight deck of USS . . . ."

Furthermore the ship was cited for outstanding accident-free operations.

That's the way things are.

More than Meets the Eye

Lakehurst, N. J.—Regarding your article about aircraft refueling, "There's More Than Meets The Eye," April '62 we certainly agree with the answers that have been provided. However, there appears to be several safety factors "that meet the eye" that were overlooked:

1. In large photo we did not see a bonding line from truck to aircraft.

2. Caption No. 1—We cannot see a dust cap on nozzle.

3. Caption No. 2—Are ratchet type nozzles really safe? We don't trust them. (Foaming overflow)

4. Caption No. 3—Is that man on the wing holding something else in one hand and a fueling line in the other?

5. Caption No 4—Where *did* he get that line? Looks like a good source of contamination if those loose threads wipe the inside of the wing inlet and some end up clogging the fuel screens.

Incidentally, while gloves are good personnel protection, I hope the man, who appears to be grasping the business end of the fueling rig, does not use the same gloves on oil issues or other dirty work and then wipe them on the issue point of the nozzles as he appears to be doing in the picture.

E. E. NAGELE, LTJG SC

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

• See next letter.

NAS, Brunswick, Me.—We have spotted two more safety hazards about which no mention was made.

Photo 2 shows two fueling personnel holding fueling nozzles. The nozzle with the alligator clip has its nozzle stops intact. This defeats the purpose of a quick shut-off, a fact dealt with in the instructor's guide, "Visual Training Aids for Aircraft Fuel Delivery Operations" (BuWeps Instruction, U. S. Navy Contract No. N600(19)55880, page 14, article titled "Gravity Nozzle.") The other unmentioned safety hazard is in photo 4 which shows a man either attaching or disconnecting an alligator clamp from the wing tank cover. Your attention is called to Transparency 80 of the above mentioned Training Aids which advises never to attach a bonding clip to the fill opening; such clip should be attached at least two feet from any fill opening.

H. W. SIMPSON, CDR, SC

• Agreed there's more than meets the eye. Re your questions:

1. It should have been connected before the hose was led to the fuel truck.

2. Dust cap should be used although some commands do not use them.

3. Ratchet type nozzles are not recommended because of overflowing tanks. (See Chief Moors' letter next.) As best as can be determined, ratchet nozzles were the only ones supply could purchase at one time with replaceable strainers. These now are obsolete as supply has procured another type without ratchets.

4. Yes. Under a magnifying glass it appears as though it is a bonding clip with cable attached. If this is the case there is definitely

more wrong than meets the eye.

5. The line is a possible source of contamination. This kind of thing is seen too often—seems there's a shortage of funds to purchase new line.

6. We agree on the condition of gloves if they are as bad as the picture shows them. (See NavExos P-422 for procurement of approved gloves and other protective clothing.)

You're so right Commander. Unfortunately NASC was not a recipient of the slides.

Ratchet Nozzle, Unsafe

Memphis—If you've ever seen a refueling hose doing the twist between parked aircraft while spraying umpteen gallons of fuel per second over aircraft, refueling truck and personnel, you'll undoubtedly agree that the most glaring hazard, in photos one and two, is notches on the refueling nozzles.

In the particular case I refer to, the nozzle was locked in the full open notch and inserted in the port tip tank of a TV-2 aircraft. The pressure control was accidentally bumped to the high side by the truck driver causing the nozzle to jump out of the plane captain's hand and go into orbit. Even though the plane captain managed to retrieve it without getting badly beaten (as 2 TVs did), he was still unable to shut the nozzle off because of the pressure. He did manage to direct the flow of fuel away from the gas truck long enough to enable the driver to secure the pump and thus stop the fuel flow. Miraculously, there was no fire, even though several aircraft involved had just completed a hop and returned to the line.

If the notches had been filed off prior to this incident, the nozzle would have automatically shut off as soon as it parted from the plane captain's hand and the incident would have been averted.

I strongly recommend that the removal of notches on refueling nozzles be SOP if not already so.

A. R. MOORS, ADJC
NATTC

Lesson Jammed Home

Atlantic Fleet—Here's a print of a poster made up locally utilizing the Center's poster "CHECK COMPLETE?" and a photo taken in the squadron. This particular instance occurred aboard ship as the wings passed through the 90-degree position on the spread cycle in preparation for a launch. The aircraft had just returned from O&R where it had undergone extensive wing repair.

check
complete?
Inventory tools after the job!
JAMMED CONTROLS
It happened in THIS squadron.... and it will again unless YOU prevent it

We were extremely fortunate that the jamming of the ailerons in the full throw position occurred on the deck rather than on a cat shot. The incident has made believers of a lot of us and I hope it will drive the point home to everyone connected with maintenance safety.

L. M. HOGAN, LT
VS-39, Aviation Safety Officer

Impact Screwdrivers Outlawed

FPO San Francisco—After reading Chief R. A. Gries letter in Feb '62 APPROACH I agree with the Chief on most of his recommendations except use of "hand impact wrenches." BuWeps Message 071947Z Sep '61 outlawed this tool and other screw extractor devices which impose high impact loads along the screw axis.

Tests conducted by BuWeps have determined that by using tools of this nature that high impact loads are applied to associated beam flanges and causes cracks in those areas.

G. D. TUNNELL GYSGT
VMF(AW)-531

● **See comment next letter**

FPO San Francisco—You've probably received some correspondence on this, but in the even you haven't. . . .

If they haven't already—maybe some day AirLant will realize the damage done to underlying structure by the "hand impact wrench"—which was highly praised by the chief from VA-44. AirPac has finally realized this potential hazard and has issued ComNavAirPac General Aircraft Bulletin No. 25-61 dated 24 Nov 1961 (Ref. BuWeps msg. 071947Z Sep '61 Notal) which prohibits the use of these hand impact wrenches.

NORMAN J. BROWN
Douglas Aircraft Co., Inc.
Product Support

● **You are both almost right. BuWeps msg 071947Z July '61 refers. AirLant got the word. APPROACH, along with Chief Gries are among the two percent who didn't.**

Vision Smoked Up

Navy 14, FPO, San Francisco—I knew smoking was good for me! Your black box on page 35 of the March APPROACH convinced me.

The table, showing the reduction in night vision effectiveness at altitudes states that while a non-smoker experiences a 100% reduction from 0-4000', a smoker suffers only an 80% reduction. Equal savings are made by smokers through 16,000!

Do you mean it?

J. W. MCGRATH, LT

● **No! we didn't mean it and your attempt to substantiate the continued use of the "lung fuze" won't**

hold smoke either.

Seriously, we will concede after some "nit pickin" of our own that for greater clarity the words "the reduction in" should have been deleted.

Fine Points of Detonation

NAS Whidbey—In your February '62 issue an article entitled "How Harmful is Detonation" listed eight probable causes for detonation. The first seven conditions we agree on but the eighth one, and I quote, "Possibly the greatest offender, leaning of fuel beyond the point of normal combustion," cannot be accepted without major qualification.

The key lies in what constitutes "normal combustion." The author loses sight of the fact that a fuel/air ratio which will give a 10% lean mixture, burns considerably cooler than a "Best Power" mixture up to maximum cruise horsepower ratings and a 15% to 20% lean mixture will burn even cooler, and would be an ideal cruising mixture if engine roughness were not encountered. This engine roughness, incidentally, at excessively lean mixtures in cruise is not "detonation" but ignition break down due to the higher resistance conditions of such lean mixtures. With a perfectly conditioned ignition system, engines will operate quite well at 15% to 20% lean mixture and cooler than at 10% lean which is nominally accepted as a "normal combustion" condition for cruise power.

Now if you really want to get detonation, just enrich this 10% lean mixture to say a 2% to 4% lean condition. You can be assured of incipient detonation then while enjoying a complete lack of it at a 12% to 14% lean mixture in the cruise horsepower range. It is not the leaning of fuel beyond the point of "normal combustion" that causes detonation, but rather *failure to lean to* the point of "normal combustion" that will put you into the detonation range while cruising along.

At higher power setting, such as takeoff and climb, a different situation develops. Here, the high temperatures and pressures of combustion are occurring at such rapidity in each cylinder, that even with the coolest burning mixture available, there is insufficient means for heat dissipation. Something must be added. For takeoff on water-injection-equipped engines, the fuel/air ratio is established at a near perfect combustion combination and water is added heat.

On other engines, additional fuel is simply added to accomplish the same, fully realizing that a loss in power will result from the extra rich mixture but is necessary in order that unburned fuel molecules might absorb and carry away the excess heat. Only in this last situation can "leaning of fuel beyond the point of normal combustion" cause detonation and here "normal combustion" must be interpreted to mean a fuel/air ratio that is much richer than that needed to insure the desired power/lb of fuel.

G. F. THUMMEL, LCDR VP-27

• Using your definition of "normal combustion" you are absolutely correct. Consensus here is that the author of the article meant *real* lean as the bottom limit of normal. Anything either side of "best power" will inhibit detonation with richer being the better.

Indications are you did considerable research in preparing your letter. Your efforts are appreciated and accordingly, we invite you to write an article for APPROACH. Please send along a biographical sketch with photo in the event you are so inclined.

T-28 Drivers, Note—

Pensacola—An item which may be of interest to T-28 drivers: UHF communications may be lost on GCA final due to shielding of the antenna in the vertical stabilizer by the prop. To counteract this, switch to the ADF position on the UHF control panel. This will select the ARA-25, which has the antenna mounted beneath the aircraft. Reception will be slightly garbled but readable.

This is considered a more satisfactory technique than increasing the approach airspeed, and though it has been widely disseminated in CNABaTra, it appears that there are aviators who have not received the word.

J. L. LOW, LT
NATTU Maintenance Officer

Traffic Pattern Priority

Cecil Field—A transient R4Y was cleared for a VOR approach. The field was VFR with heavy local jet traffic. The R4Y let down to the minimum and proceeded inbound, in contact with RATCC. RATCC (with a student controller) told the aircraft to climb to ASR base leg altitude and vectored him around for an ASR approach to the duty runway. The pilot of the R4Y did not approve of this procedure.

This leaves me with one basic question. What does an IFR clearance actually give you when the weather is VFR?

L. G. BRAMLEY, LCDR
NAS

• Federal Aviation Agency policy gives an answer to "who has priority in the landing sequence when both VFR and IFR traffic are waiting to land."

". . . the policy of the Bureau of Air Traffic Management is to sequence aircraft in a traffic pattern on a 'first-come, first-served' basis regardless of the type of flight plan. No priority will be afforded IFR aircraft."

Count Down

NAS Moffett Field, Calif.—Recent unofficial investigations into the record keeping at North Island indicate that during the month GCA 4 set its record (March '62 APPROACH) all section approaches conducted by GCA were counted as two approaches. When Moffett RATCC established its record during August 1960 each section approach was counted as one approach, which gives a much more realistic figure. As any of the pilots of the three air groups and the two RAG squadrons based at Moffett during August 1960 can tell you, section approaches to Moffett constituted a substantial percentage (estimated 30-50%) of our approaches. If each of these section approaches had been counted as two (using North Island's record system), Moffett's record would undoubtedly have exceeded 4000.

Moffett RATCC extends its congratulations to GCA 4 and suggests perhaps counting landing gear approaches would really establish a record.

W. R. PHILLIPS, LCDR

• Until official investigation dictates otherwise, we will accept the North Island release as official. Who knows, maybe we should count landing gear on approaches, but I'm sure we would hear a loud rumble from the seaplane boys and their approaches.

How about an article on your outfit, their accomplishments and suitable pictures of personnel at work or aircraft inflight?

APPROACH is your aviation safety voice—let us hear from you real soon. ●

Transferring?

If you've transferred recently, or moved locally, and have a personal *subscription* to APPROACH, please send your change of address to Supt. of Documents, Government Printing Office, Washington 25, D.C.

LIFT and DRAG

Help Us Help You

Many events in history would have been changed had a certain question been asked at a certain time.

Not only in the cockpit, but in maintenance departments, overhaul and repair facilities, aircraft design and manufacturing, the same thing holds.

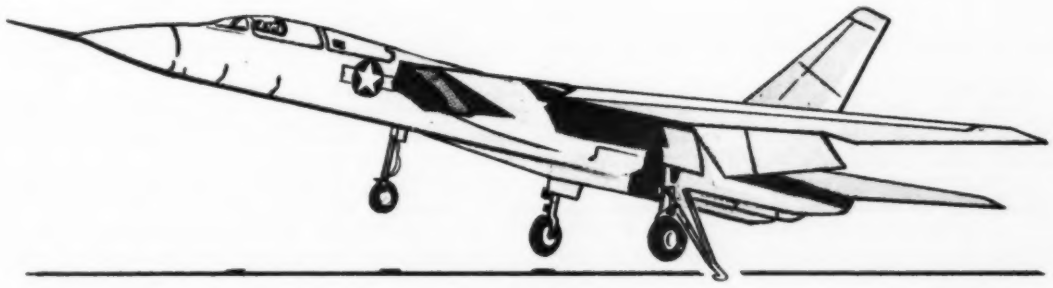
But today we are most concerned with its application to the field of operational research — to aviation safety and accident prevention information and philosophy.

The Naval Aviation Safety Center's records hold what is probably the largest single storehouse of naval aircraft mishap data and prevention philosophy. The greatest amount of information of course is in the minds and procedures of you folks in the fleet, but the fact remains that despite our contacts, our own experience, and the many required reports, there are many areas of question which remain unanswered.

It is the Center's earnest desire to provide priority to the answering of your questions, to visiting you and counseling with you on a particular problem which may lead to an accident. We would much rather spend time and money before the accident, than after. For the ultimate weapon of accident prevention, *if there be only one,* is foresight.

So let us hear from you, now. Requests or queries can be as formal or as informal as your command desires. Please note that certain proposals of a major training and equipment nature may more properly be addressed initially to other commands like BuWeps, but in such instances NASC would appreciate and can profit by an info copy.

In any case, the important thing is to let us know more in detail how we can help you. Only then and only together can we achieve more reliable and successful naval air operations ! ●



Our product is Safety, our process is education, and our profit is measured in the preservation of lives and equipment and increased combat readiness.

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RADM W. O. Burch, Jr. Commander, NASC

CDR D. M. Hanson
Head, Safety Education Dep't

A. Barrie Young, Jr.
Editor

CDR T. A. Williamson, Jr.
Managing Editor

LCDR J. R. Foster
Flight Operations Editor

J. T. LeBarron
Research/Ass't Flight Ops Editor

J. C. Kiriluk
Maintenance/Ass't Managing Editor

Julia Bristow
Aviation Medicine/Survival Editor

Robert B. Trotter
Art Director

Blake Rader
Illustrator

Ray Painter PHI
Photographer

J. F. Holgate, JO2
Production Assistant

PHOTO & ART CREDITS

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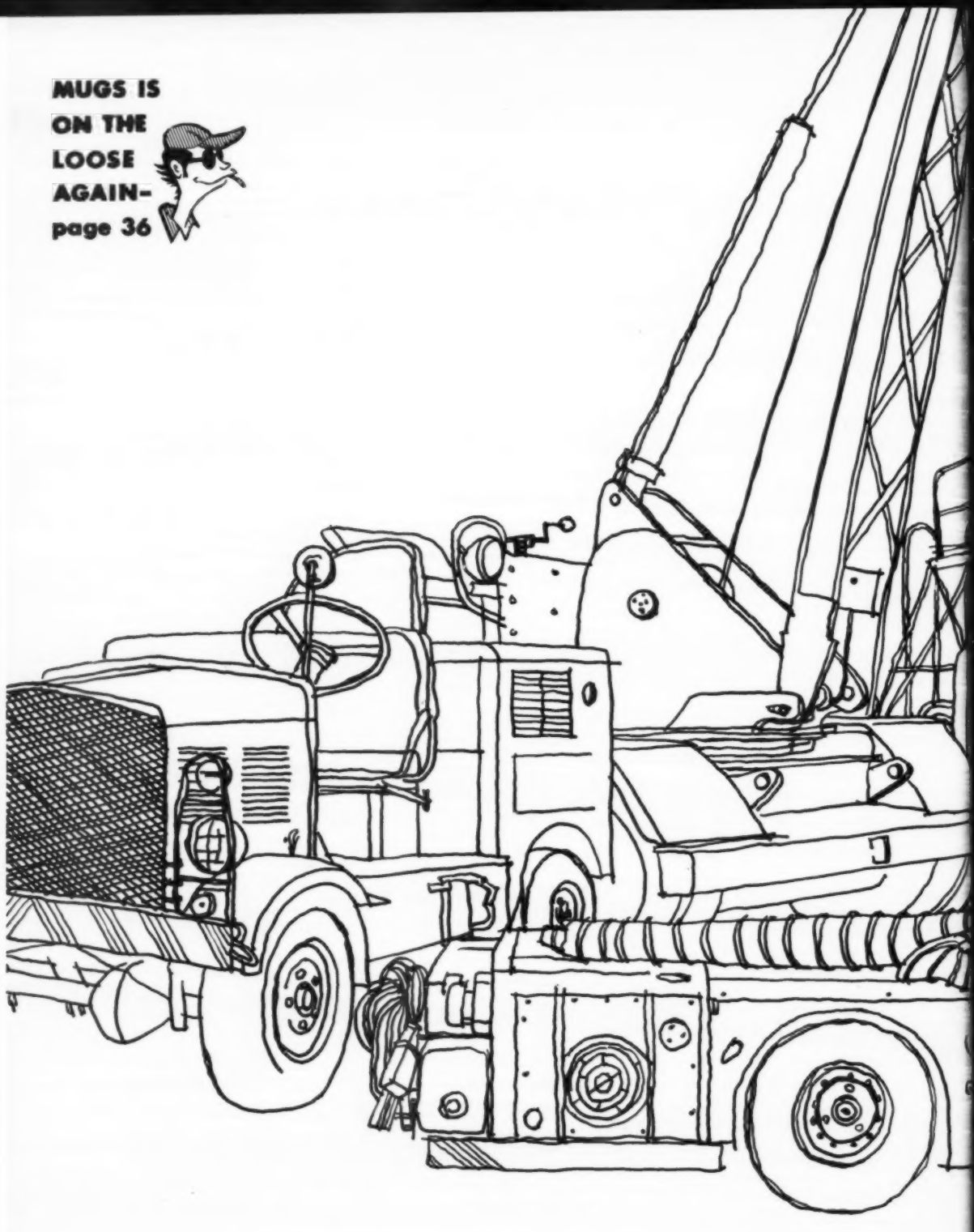
An Invitation...

The question of where to locate the survival knife on the pilot's or aircrewman's person continues to be a knotty problem. Many factors have a bearing on the placement of the knife: type of aircraft, various and varying flight clothings, antiexposure, anti-G suits and other related equipments plus the existence of right-handed and left-handed pilots. In order to provide maximum dissemination of valuable ideas for placement already developed at the user level, readers are requested to submit these ideas to the Naval Aviation Safety Center (Code 43) with appropriate sketches and photographs for Navy-wide consideration via NASC publications.

MUGS IS ON THE LOOSE AGAIN–

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